# MASTER HIGHWAY PLAN

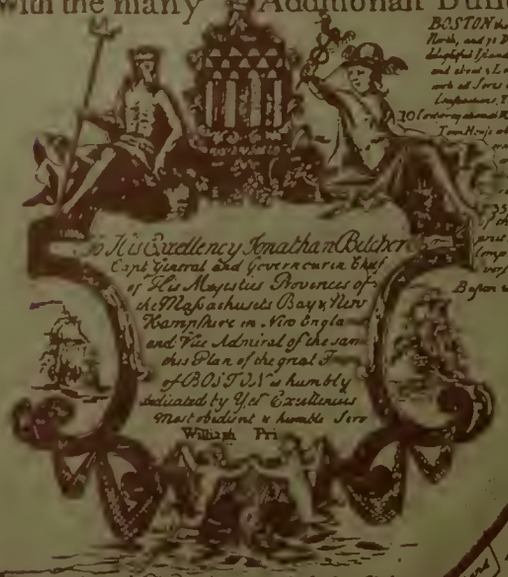
1948

*for the*

BOSTON METROPOLITAN AREA

# A New Plan of ye Great Town of BOSTON in New England in AMERICA

With the many Additionall Buildings, & New Streets, to the Year 1769.



To His Excellency Jonathan Belcher Capt. Generall and Governour in Chief of His Majesties Provinces of the Massachusetts Bay & New Hampshire in New England and Vice Admiral of the same this Plan of the great Town of BOSTON is humbly dedicated by Yt Excellencys most obedient & humble Serv William Pri

BOSTON the Metropolis of New England, is the largest most populous and flourishing Town in the British Dominions in America, in the Lat. of 42 deg 20 min North, and 71 Deg West from London. It stands at the Bottom of a large Bay which (by means of Islands from the Ocean) forms a good Harbour (adapted for Islands) Ships to ride in safety among the safest and most commodious Harbours in the World. At the Entrance of ye Harbour is a good Light House and about ye Light upon it a Town, a Strong Cast Mounted with about 100 Cannon. The Country round about is exceedingly Enlightened with Villages and all Sorts of provisions, by which all other Places are supplied. Ships, Vessels & Boats of all Sizes, Trades & Occupations. This Town hath been Settled 139 Years: the Number of Houses about 3000 and Inhabitants about 20000 Souls: Here are 9 Churches besides other Publick Houses &c. Here is also a Town House where the Courts are held. This Town and country daily increasing. In the Year 1747 over-look'd in New England above 40 Sail of Ships and other Craft in Port at the same time. Here are stand at Boston. There are in one Year about 140 ships. This Port at the same time, about 1000 Sail of Ships which are in some Measure above the proportion of the Shipping from and country in the Year.

As this Town was Divided into 10 Wards, & a Vote of the Inhabitants the bounds of the Wards are the great Lines from No 1 to 10, in each Ward is a Militia Company of foot & a Captain to Alter one Corporal of the Poor Chuses Yearly in March

Boston was first Settled in ye Year 1630

Printed for & Sold by Wm Price at ye King's Head & Looking Glass in Cornhill, Near the Town House in Boston, Where is Sold a Large New South East Prospect of Boston Neatly done & A Prospect of the Colledg in Cambridge in New England And Great Variety of Maps & Prints of all Sorts in Frames & Glass or without Also Pictures Painted in Oyl in Carvd Gilt Frames Likenesses Silks and Frames also Sorts of Looking Glasses Fine Tea Table China Ware English & Dutch Toys for Children by Wholesale or Retail at Reasonable Rates

Note this hand Points to the King's Head & Looking Glass in Cornhill

Charles River

Ferry to Charles-Town is about half a Mile over

Eb. N. Mill Dam

Mill Pond

Fox Hill.

Powder House

Watch House

COMMON

School

Old Wharfe.

Long Wharfe.

Hills Wharf

Wind Mill Point

Fort Hill

S. Battery.

HARBOUR

Middle's Island and Hog Island included in Ward 2

Scale of ½a Mile.

## Boston New England Explanation.

| Plantd | An. Dom. | |
|---|---|---|
| A The Old Meeting | 1630 | a Town House. |
| B Old North M. | 1650 | b Governours House. |
| C Old South M. | 1660 | c South Grammar School. |
| D Annabaptist M. | 1680 | d North Grammar School. |
| E Kings Chapel Ecclis | 1688 | e Writing School. |
| F Presbyt. M. | 1699 | f Alms House. |
| G Anglican M. | 1710 | g Bridewell. |
| H New North M. | 1714 | h Town Granary |
| I New South M. | 1715 | The Worlds Mulberry Companies Do progress Ed by the Pricks Lines that... |
| K French M. | 1716 | From No 1 to 10..... |
| L Anabaptist M. | 1725 | |

Watch Fire-1631 Theft Trouble

Hath for Letter of the ends of the Streets as to the extent of Each Ward.

| Great Fires. | |
|---|---|
| First | 1653 |
| Second | 1670 |
| Third | 1679 |
| Fourth | 1683 |
| Fifth | 1690 |
| Sixth | 1691 |
| Seventh | 1702 |
| Eighth | 1711 |

| Gen Small Pox. | |
|---|---|
| First | 1640 |
| Second | 1666 |
| Third | 1677 |
| Fourth | 1690 |
| Fifth | 1702 |
| Sixth | 1721 |
| Seventh | 1730 |

M. Christ Church Founded 1723.
N. Irish Meeting House 1731
O Hollis Street Meeting 1734.
P Trinity Church Founded 1734.
Q Lynds Street Meeting built 1736.
R Wood House built 1738. S. Bennet Street Meeting built 1762.
T. Faneuil Hall & Market house, a handsom, large brick building Worthy of the Gen... erous Founder Peter Faneuil Esq. who in the Year 1742 Gave it to the Town for the use... Market Days Tuesday, Thursday and Saturday

FINE ARTS DEPT.

Copy 2

THE

# MASTER HIGHWAY PLAN

*for the*

# BOSTON METROPOLITAN AREA

SUBMITTED TO

**HIS EXCELLENCY, ROBERT F. BRADFORD**
*Governor of The Commonwealth of Massachusetts*

BY THE

**JOINT BOARD FOR THE METROPOLITAN MASTER HIGHWAY PLAN**
*based upon a* TRAFFIC SURVEY *by the*
**DEPARTMENT OF PUBLIC WORKS**

---

**PUBLIC ROADS ADMINISTRATION, FEDERAL WORKS AGENCY PARTICIPATING**

---

CHARLES A. MAGUIRE AND ASSOCIATES
*Consulting Engineers*
BOSTON

IN COOPERATION WITH

DE LEUW, CATHER AND COMPANY, CHICAGO

J. E. GREINER COMPANY, BALTIMORE

February 1, 1948

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# JOINT BOARD

FOR THE

# METROPOLITAN MASTER HIGHWAY PLAN

*Appointed by Executive Directive, August 9, 1947*

WILLIAM H. BURACKER, *Chairman*
Commissioner of Public Works

ELISABETH M. HERLIHY, *Vice Chairman*
Chairman, State Planning Board

WILLIAM T. MORRISSEY, *Vice Chairman*
Commissioner, Metropolitan District Commission

HAROLD J. DUFFY, *Secretary*
Chairman, Technical Committee
Metropolitan Project Engineer, State Planning Board
11 Beacon Street, Boston 8, Massachusetts

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District Engineer, Public Roads Administration

BENJAMIN R. DAVIS
Chief Park Engineer, Metropolitan District Commission

BENJAMIN W. FINK
Associate Civil Engineer, Metropolitan District Commission

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Senior Civil Engineer, Metropolitan District Commission

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Chief Engineer, State Planning Board

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Traffic Engineer, Department of Public Works

JOSEPH C. CRESSY
Assistant Traffic Engineer, Department of Public Works

LOUIS H. SMITH
Assistant Civil Engineer, State Planing Board



PRINTED IN U.S.A.

*The Commonwealth of Massachusetts*

## JOINT BOARD

FOR THE

## METROPOLITAN MASTER HIGHWAY PLAN

February 1, 1948

Honorable Robert F. Bradford
Governor of the Commonwealth of Massachusetts
State House, Boston, Massachusetts

YOUR EXCELLENCY:

THE JOINT BOARD, organized in compliance with your Excellency's directive of August 9, 1947 for the purpose of preparing a Master Plan of Highways for the Boston Metropolitan Area, hereby submits its report as directed, together with the report of its consulting engineers.

The Board has been fortunate in having as its consulting engineers Charles A. Maguire and Associates of Boston and their affiliates, DeLeuw, Cather and Company of Chicago, and J. E. Greiner Company of Baltimore. Exceptionally well qualified for this type of work, the consultants, through their highly trained technical staff, have achieved remarkable progress in the relatively short time allotted them. The Joint Board has also had the assistance of a Technical Committee composed of engineers from the three participating State agencies, the Department of Public Works, State Planning Board, and the Metropolitan District Commission, and the District Engineer of the Public Roads Administration, Federal Works Agency. Federal funds have participated in defraying the costs of the Master Plan study and its related traffic survey.

The Master Plan as developed for the Area, which includes 23 cities and towns in addition to Boston, is based upon the origin and destination traffic survey which was conducted by the Department of Public Works in co-operation with the Public Roads Administration, Federal Works Agency. A complete description of the survey, the analysis of the data, and its interpretation for

assignment to traffic routes are included in the consulting engineers' report.

The system of highways, proposed by the Joint Board as a ten-year construction program for the relief of traffic congestion in the Area, embodies as its backbone a network of expressways of latest modern design and of sufficient capacity to take care of the traffic needs of the Area for many years to come. The major expressways will be of limited access type, providing for swift, uninterrupted flow of traffic and with no entering or cross streets except at prescribed points of interchange where grades will be separated. The pattern of expressways, as indicated by maps accompanying the consultants' report, takes the form of eight radial routes projecting in as many directions from an inner circumferential or belt highway around the City. All of the proposed routes and the belt highway are described in detail and shown by separate maps in the report.

Improvements to existing streets and highways will be necessary to supplement the major expressway system in order that efficient collection and distribution of traffic to and from the expressways may be effected. These proposed improvements vary in magnitude from major street widenings and grade separations to re-arrangement of one-way streets, channelization of traffic, and installation of traffic lights. The report calls attention to the importance of off-street parking as a means of getting the greatest use out of our highway systems, both present and proposed, and cites the advisability of conducting complete parking surveys as the basis for long range planning of parking facilities.

The report forcefully discusses the necessity for complete coordination between transit and highway planning and stresses the importance of integration of this Master Highway Plan with the transit development plans of the Metropolitan Transit Recess Commission and the Metropolitan Transit Authority.

The report presents estimates of costs which include construction at current prices and land damages at assessed values. The total cost of the Master Highway Plan, including improvements to existing streets is estimated to be $322,000,000. A program of stage construction, based upon priority of need and indicating costs by construction periods is also included. This, however, is a flexible arrangement and may be varied from time to time to suit changing traffic demands or fluctuating financial conditions. Considering the magnitude of the plan as proposed it is not surprising that the cost estimates reach into many millions of dollars.

As was pointed out by Your Excellency in the directive of August 9, the highway problems of the Commonwealth are not confined to the Metropolitan Area. In addition to those of this Area there exist throughout the remainder of the State many points of acute traffic congestion, many miles of inadequate highways, many bridges of insufficient width and strength. These problems are recognized in the current report of the Department of Public Works on State Highway Needs. To correct these conditions, many additional millions of dollars will be needed.

In attempting to produce a financing program for the Metropolitan Plan the needs of the remainder of the State must be kept in mind, and a fair balance maintained in order that an equitable expenditure of highway funds may result. Current gasoline tax incomes will undoubtedly prove inadequate to provide for underwriting the program on a "pay-as-you-go" basis. On the other hand, attempting to scale construction progress down to meet the tempo of normal highway fund income would prolong completion of the Plan too far into the future. Means should be found that will provide for an accelerated ten-year construction program, and at the same time keep gasoline tax levies within reasonable bounds.

Your Joint Board, being firmly of the opinion that speed of accomplishment is the very essence of the proposed metropolitan highway system, urges that every reasonable step be taken to bring about its effectuation within the prescribed ten-year period. As previously pointed out, this cannot be accomplished under any "pay-as-you-go" policy, based upon present highway funds.

While it is essential that the expressway system be completed in the shortest time possible, it should be remembered that the system is designed to care for our major highway needs for years into the future. It is only reasonable to expect that the future users of the system should share in its cost. It is recommended that beyond the amounts which may be appropriated from current revenues, the remainder of the costs be financed by long-term bond issues, using part of the proceeds of the Highway Fund for amortization. The projects proposed by the Master Plan represent a total cost approximately equal to that of the Department of Public Works program for the remainder of the State. It therefore seems reasonable to expect that one-half of the future funds available for new construction should be allocated toward the financing of this Plan. Upon that basis, studies by the Joint Board indicate that the proposed bond issues could be amortized within a 30-year period provided that there be imposed an additional State-wide gasoline tax of one cent per gallon, one-half of which should be earmarked for the Metropolitan Area.

The entire financing program could undoubtedly be greatly accelerated by the collection of tolls from users of the expressway system. The consultants' report under the chapter "Economic Justification," points out the savings in time and money inherent in the use of modern superhighways. The proposed expressways will afford their users such savings in time and such comfortable and pleasant travel conditions that it is doubtful if there would be any substantial opposition to the imposition of small tolls. The collection of nominal tolls would not only serve to speed up the construction program but would hasten the retirement of the bonds and permit the removal of the extra gasoline tax at the earliest possible date. Inasmuch as a decision to recommend a specific system of tolls would have to be based upon an exhaustive scientific study involving many complicated factors, the Board is unable to make such definite recommendations at this time. It is urged, however, that this be immediately made the subject of such a study.

A serious impediment to all major highway development in recent years, one which may well continue for some time, has been caused by the housing situation. Although every possible attempt is always made in laying out highways to avoid the taking of residential property, it is impossible to locate new arterial routes in urban areas without affecting some homes. The natural reluctance on the part of highway officials to force people to vacate their homes in these times of housing shortages, while understandable, has nevertheless resulted in the postponement of essential highway projects. On the other hand, the vigorous opposition of persons whose homes are involved is also easily understandable. Arguments that the few must suffer for the benefit of the many fail to impress the man who is told he will have to vacate his home to make way for a projected highway. In this day and age a more sympathetic approach to the problem is needed.

It should now be recognized that the relocation of tenants is an integral part of a highway project. If homes must be taken to clear the right of way, advance provision should be made to relocate the occupants in new living quarters equally as good as those they are required to leave. Admittedly not easy of accomplishment under present housing conditions, the solution should be attempted in a realistic manner, as is being done in other cities such as New York, Chicago, and Los Angeles. When the structural condition of buildings permits, they should be moved to nearby vacant land. To assist tenants there should be set up an office of tenant relocation in conjunction with each major highway project. In congested areas, particularly those of substandard housing nature, consideration should be given to mass relocation of tenants in new housing projects. Sincere efforts along these suggested lines should go a long way toward facilitating the acquisitions of rights of way and making possible an early start on actual construction.

Since the entire program will require at least ten years to complete, it can readily be seen that normal use and develop-

ment in the meantime of the land to be affected by right of way acquisition could result in such growth and expansion that values would reach prohibitive proportions. One way to protect the State's rights would be to make immediate takings of all properties to be involved. Such a procedure would obviously be impracticable since the necessary expenditures would unbalance the entire financial plan and upset the stage construction program. As an alternate, there could be established a policy of development control, similar to that of Ohio or Pennsylvania, whereby the State would immediately define the right of way lines but postpone actual takings until necessary for construction. Under such an arrangement land would remain in private ownership, with the provision that its existing use may continue by the owners, but no change in use, nor improvement, nor subdivision be allowed without official approval.

This action would naturally raise the objection that undue hardship was being imposed upon property owners by restricting the free development of their holdings. This could be met by proper reimbursement to the owners for the limitation of use and occupancy.

Your Joint Board concludes its report with the following comments and recommendations:

For the first time the State now has a Master Highway Plan for the Boston Metropolitan Area based upon reliable factual data, data supplied by the people themselves. It might, therefore, be paraphrased, not as the Joint Board's Plan, not as the Consultants' Plan, but as the People's Plan. If the industrial, social, and economic life of the Area is to be preserved, it must be freed from the transportation strangulation it now faces.

The Joint Board therefore recommends:

I. That the Plan be adopted as the Master Plan of Highways for the Boston Metropolitan Area.

II. That its financing be implemented in part by a proportionate share of a State-wide additional gasoline tax of one cent per gallon.

III. That its cost be paid insofar as practicable by long term general obligation bonds of the Commonwealth.

IV. That a complete study of the feasibility of toll collection on the expressway system be instituted immediately by the Joint Board.

V. That legislation providing for the relocation of tenants of properties affected be enacted.

VI. That legislation providing for the control of the development of land related to highway projects be enacted.

VII. That consideration be given to the desirability of conducting parking surveys in Boston and other municipalities.

VIII. That the Joint Board be continued for the purpose of assisting in the preparation of legislation and in further development and effectuation of the Master Plan.

IX. That the policy of highway master planning as established by this report be expanded to cover the other metropolitan areas throughout the State, to be based upon origin and destination studies by the Department of Public Works, the same to be correlated with the ten-year program of the Department by joint action of the Department of Public Works and the State Planning Board.

X. That funds be appropriated to carry out the provisions of recommendations IV and IX above, recommendation IX to be on the basis of Federal funds participating.

The members of your Joint Board have been proud to serve in this capacity. The origin and destination traffic survey conducted by the Department of Public Works in co-operation with the Public Roads Administration has been of immeasurable value. It has been a pleasure to work with the consultants in the formulation of the Master Plan. Their diligent and intelligent approach to the problem has resulted in the splendid, comprehensive report appended hereto, prepared independently, with a free hand, and based solely upon factual data.

For the earnest and sympathetic consideration of Your Excellency, the General Court, municipal officials, civic and other interested agencies, and all of the people of the Commonwealth, this report is

Respectfully submitted,

William H. Buracker

WILLIAM H. BURACKER, *Chairman*
Commissioner of Public Works

Elisabeth M. Herlihy

(Miss) ELISABETH M. HERLIHY, *Vice Chairman*
Chairman, State Planning Board

William T. Morrissey

WILLIAM T. MORRISSEY, *Vice Chairman*
Commissioner, Metropolitan District Commission

THE COMMONWEALTH OF MASSACHUSETTS

# *The* MASTER HIGHWAY PLAN *for the* BOSTON METROPOLITAN AREA

PREPARED FOR THE JOINT BOARD FOR THE METROPOLITAN MASTER HIGHWAY PLAN

IN COOPERATION WITH THE PUBLIC ROADS ADMINISTRATION, FEDERAL WORKS AGENCY

1948

*by*

CHARLES A. MAGUIRE AND ASSOCIATES
*Engineers*
BOSTON, MASSACHUSETTS

J. E. GREINER COMPANY · BALTIMORE
DeLEUW, CATHER & COMPANY · CHICAGO
*Consultants*

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# LETTER OF TRANSMITTAL

CHARLES A. MAGUIRE AND ASSOCIATES
ENGINEERS
46 CORNHILL
BOSTON 8, MASSACHUSETTS

February
First
1 9 4 8

William H. Buracker, Chairman
Joint Board for the Metropolitan
Master Highway Plan
100 Nashua Street
Boston 14, Massachusetts

Dear Sir:

We are pleased to submit herewith the Master Highway Plan for the Boston Metropolitan Area in compliance with our agreement dated September 5, 1947.

Major recommendations include a system of expressways to accelerate traffic flow in the area and a distributing facility, generally referred to as a Central Artery, for downtown Boston.

The solution of the problem is dictated by the facts produced by the splendid and basic Origin and Destination Survey conducted by the State Department of Public Works in co-operation with the Federal Public Roads Administration.

Many of the proposals have been previously recommended and are included herein where they coincide with the factual data produced by the Survey above mentioned.

Though we have tabulated costs, we do not presume to outline any formal financing program. The elements of civic pride, community benefit, construction costs, state finances

and governmental participation are factors which can best be considered by civil authorities in compounding a formula for progressive action.

Communities have to balance the cost of betterments against the cost of neglect. Governments must weigh the underwriting of long-term improvements against the assumption of losses through cumulative deterioration. The authorization of this report is proof of the awareness of the problem and the State's eagerness to solve it. We feel that the solution is here, but the citizenry should be informed not only of the prospect but of the cost, so that once dedicated to the improvement they will be determined on its completion.

Official adoption and initiation of final design of the plan recommended will permit the various municipalities to coordinate and perfect the functional use of existing street systems and to proceed with definite plans for such improvements as one-way streets, channelization of complicated intersections, street widenings, transit routings, bus terminals and similar matters. Public and private agencies are properly holding plans in abeyance pending action on this controlling factor.

The prestige and confidence inspired by the membership of the Joint Board have been of invaluable assistance and we wish to express appreciation for the opportunity afforded us to participate in the solution of this major problem.

Respectfully submitted,

Charles A. Maguire

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# FOREWORD . . .

THE TRAFFIC CONGESTION PROBLEMS OF THE BOSTON Metropolitan Area have been the subject of studies for a number of years. The Whitten Thoroughfare Plan for Metropolitan Boston in 1930, the McClintock Boston Traffic Report of 1929 and the Origin and Destination Survey by the State Department of Public Works are outstanding examples of the wealth of information that has been gathered in an effort to solve these problems.

It is our purpose to present in this report a complete and comprehensive review of existing traffic conditions in the area, and to formulate, on the basis of the origin and destination survey data, the anticipated increase in vehicular traffic for which provision should be made.

We recommend the adoption of a modern high-speed expressway system as the foundation on which highway construction should be programmed for the ultimate solution of the problem.

We gratefully acknowledge the cooperative assistance of the membership of the Governor's Joint Board for the Metropolitan Master Highway Plan and of the Technical Committee composed of engineers of the State Department of Public Works, the Metropolitan District Commission and the State Planning Board. We express our appreciation also to the federal, state and municipal agencies, including the Public Roads Administration, Federal Works Agency, and to civic organizations and the many individuals, who have freely furnished valuable data based on their studies and experience.

# INTRODUCTION

**METROPOLITAN BOSTON** FOR 300 YEARS, HAS BEEN THE HUB OF NEW ENGLAND'S transportation facilities. A seaport of renown, Boston now promises to become an air terminal of equal international importance. Railroads radiate to the north, south and west, while more than a hundred highways cross a cordon line around the Metropolitan Area. This accessibility promotes active trade and generates the employment to support the population of one of the world's truly great cities.

All of the people and all of the goods, whether they arrive in Boston by air, sea, rail or highway, are transported to their ultimate destinations over the streets of Boston and of the many other cities and towns comprising the Metropolitan Area. Superimposed on this movement is the daily travel of the residents to and from the numerous colleges and universities, the office buildings, the retail stores, the industrial plants, and all the other traffic generators of the area. It is now known for the first time that these trips by automobile, by truck, and as passengers of public carriers exceed two million persons daily.

Many of the streets in Boston and in the surrounding cities and towns were intended for no more voluminous traffic than a few wagons per day and an occasional rider on horseback. These narrow streets are in no sense adequate for the movement of automotive traffic, and in some cases cannot even furnish proper access to abutting property for the delivery of goods. There are a number of fine arterial streets and parkways in the area, however, which, through constant improvement, have served the needs of traffic reasonably well until recent years.

As in all other large American cities, improvement of traffic facilities has been curtailed during the past two decades, first, as a result of the depression and then because of the shortages of manpower and materials during World War II. During this same period, and despite the retarding factors mentioned, vehicular traffic in the Boston Metropolitan Area, as measured by gasoline consumption, has increased fifty per cent and is currently growing at an amazing rate.

Greater Boston is no worse off for traffic facilities than other cities of comparable size. All of them are planning new urban highways which will cost many millions of dollars in each city. Boston is perhaps fortunate in not having spent large sums, as several other cities have done, for traffic improvements which are obsolete when measured against present standards for urban highways. Boston can now profit by the mistakes and experiments of other cities and can build with confidence a modern system of traffic facilities.

Your Joint Board has very wisely concluded that it is time to review past accomplishments, assemble the best available information and ideas for needed improvements, and then prepare an integrated Master Highway Plan. This plan to provide for the

future needs of highway traffic must be comprehensive enough to accomplish this objective and yet be within the financial means of the community.

In preparing such a plan, your consultants have drawn freely on the talents and past labors of the many local agencies and groups which have studied and reported on traffic and highway problems of the area. Most of the ideas contained herein were proposed first by others. A large number of reports were utilized in the preparation of these plans. Proposals for needed highways and other improvements have been taken from these reports without it being possible in all instances to give well-deserved credit. The consultants endorse, however, and assume responsibility for any opinions stated or plans proposed.

The successful culmination of an engineering, legislative and financial program to secure modern street and highway facilities for the Boston Metropolitan Area will require the best efforts of every individual and every agency concerned with this problem. In the accomplishment, there will be ample credit for all.

## METHOD OF APPROACH

A great mass of relevant data was made available to your consultants as a basis for the conclusions and recommendations embodied in this report. The foundation of the entire Master Highway Plan rests on the facts derived from the origin and destination study of motor vehicles. These data were secured in the survey made by the Department of Public Works of the Commonwealth of Massachusetts with the cooperation of the Public Roads Administration, Federal Works Agency. This information has been supplemented by traffic studies made by various agencies in all parts of the Metropolitan Area.

The consultants also had the benefit of the advice and counsel of numerous official and semi-official bodies and of individuals. This aid has ranged in degree from calling attention to troublous traffic spots to the submission of complete preliminary plans.

The consultants spent considerable time in the field to become familiar with the geography of the area, with the nature of the various existing traffic facilities and with the characteristics of traffic. Reconnaisance surveys of potential rights-of-way for new highways were made on several times as many miles of routes as were finally incorporated in the recommended system of expressways. Studies were also made of the cost of alternate plans, both for rights-of-way and for construction, together with traffic-wise evaluations of such alternates.

## RECOMMENDED SOLUTION

A complete system of expressways to serve the entire area forms the backbone of the recommended solution to Metropolitan Boston's complex traffic problems. So that there may be no confusion in the use of terms, it should be made clear that the word "expressway" as used in this report is synonomous with the terms "freeway" and "limited access highway." Expressways in this sense are channels for the uninterrupted movement of motor vehicles. They are connected with the adjoining street system through properly designed entrances and exits at reasonably spaced intervals. Generally depressed below the level of the territory through which they pass, they occupy strips of generous width with properly landscaped side slopes, giving them a park-like appearance. They may be built as elevated structures, however, in areas of high property values; where a depressed roadway would be below sea-level; or where existing underground structures, such as subways, make depressed roadways infeasible. In the outer portions of a metropolitan area where cross-streets are infrequent, it is often possible to build expressways conforming generally with existing ground contours over considerable distances. On a true expressway of any of these types, the inter-

ferences and accident potentials of pedestrians, cross-traffic, bus stops, parking maneuvers and other traffic hazards are eliminated by physical means. Expressways may be restricted to private automobiles or they may be opened to general highway traffic. The expressways discussed herein are intended for the use of all types of vehicles unless otherwise explicitly stated.

Functional plans have been prepared for surface improvements in downtown Boston which are deemed sufficient to make possible the collection and dispersion of expressway traffic. These recommended changes will also expedite the movement of traffic to and from the area on other major arteries, present and proposed.

A network of principal streets covering the entire metropolitan area has been selected. It is recommended that the streets so designated be brought to maximum possible efficiency by the proper use of traffic signs, signals and markings; by the enactment of needed parking regulations and stringent enforcement thereof; by the installation of modern street lighting to bring the level of illumination on each artery to the standard recommended by committees of impartial authorities specializing in this field; and, where appropriate, by more elaborate physical changes such as channelization, by-passes, or grade separation structures.

These plans for new highway facilities and for improvements in the use of those now existing will not be adequate unless other plans now under consideration, or their equivalent, are carried out successfully. Among these complementary plans are the program for extensions and betterments of the rapid transit system, the union truck terminals proposed by the Boston City Planning Board, plans for an improved and relocated market district, and plans for off-street parking facilities not only in downtown Boston but also in other parts of the metropolitan area.

It should be emphasized that no one can ride to work on *plans* for highways. This report must be implemented by proper legislative action, by a sound financial plan and by a vigorous construction program to assure these recommendations being transmuted into steel and concrete.

# TRAFFIC STUDIES

THIS MASTER HIGHWAY PLAN STUDY IS BASED ON THE most comprehensive traffic data ever available in the Boston Metropolitan Area. The costliness and complexity of modern urban highway improvements require a sound foundation of factual data. For this reason, a technique of gathering and analyzing complete information on the origins and destinations of trips by individuals in private or commercial motor vehicles and by mass transportation has been developed to a high degree of refinement during recent years. This type of information forms the background for this report.

The origin and destination study in Boston and vicinity is similar to those recently completed in 60 other American cities of all sizes. The study consists largely of travel data obtained through home interviews, supplemented by an external survey which involved roadside interviews and traffic counts. This survey was undertaken by the Department of Public Works, Traffic Division, Commonwealth of Massachusetts, in cooperation with the Public Roads Administration, Federal Works Agency.

In rural areas, the pattern of vehicle movement can generally be determined satisfactorily by counting vehicles. If additional information is required, the vehicles may be stopped and such pertinent information as origins and destinations obtained. In urban areas, however, traffic congestion and the multiplicity of streets make roadside interviewing impractical. In addition to the movement of passenger cars, taxis and trucks, it is necessary to obtain data on the movements of individuals themselves, whether they travel by private vehicle, truck, taxi, street car, bus or otherwise, and it is especially important to obtain information concerning their origins and destinations. Further, it is important to know when, where, how and for what reason people travel.

## DESCRIPTION OF ORIGIN AND DESTINATION SURVEY

### *Study Area*

The Boston Metropolitan Traffic Study Area is comprised of approximately 380 square miles with an estimated population of 1,810,000. In addition to the City of Boston, the following cities and towns are included in the study area: Arlington, Belmont, Braintree, Brookline, Cambridge, Chelsea, Dedham, Everett, Lynn, Malden, Medford, Melrose, Milton, Newton, Quincy, Revere, Saugus, Somerville, Waltham, Watertown, Weymouth, Winchester and Winthrop. The study area is served by three U. S. routes, namely, 1, 3, and 20, in addition to state numbered routes as shown on

Plate 1 — Regional Map Showing U. S. Routes,

Plate 2 — Important Roads, Cities and Towns Adjacent to Study Area.

### *Division of Study Area*

In order to obtain complete information on traffic movements, each city and town within the study area was divided into zones and further subdivided into sectors, the latter consisting of two or three city blocks. The area was thus subdivided into 138 zones and 648 sectors of which 17 zones containing 177 sectors were located in downtown Boston. For analysis, the zone was used as the smallest subdivision except for special studies. However, all origins and destinations were coded by both zones and sectors, which will make possible the study of specific highway locations as required. Plate 3 shows the subdivision of the study area into zones.

*Sampling and Interviewing*

A sampling technique similar to the method successfully employed in public opinion polls was used. The accuracy of this procedure has been proven by the Bureau of Census, and by the experience in other metropolitan areas in conducting similar surveys. Its success depends on the selection of a truly representative sample and the proper training and supervision of interviewers.

The origin and destination study was divided into two phases:

1. Internal survey, including
   a. Selection of samples for homes, trucks, and taxis
   b. Home interviews
   c. Truck interviews
   d. Taxi interviews
2. External survey
   a. Traffic counts
   b. Roadside interviews

In selecting the sample for home interviews, Sanborn and zone maps were used. A five per cent sample was selected which produced 21,444 units, from which 22,512 interviews were obtained, and 22,409 were completed. (Some units contained two or more households.)

In the case of both taxicabs and trucks, a 10 per cent sample was used. A total sample of 194 taxis was selected which produced 172 interviews. In the truck survey a sample of 2,873 trucks was selected which produced 2,381 interviews. The difference between the total sample and total interviews is accounted for by the fact that some of the sample vehicles were out of operation.

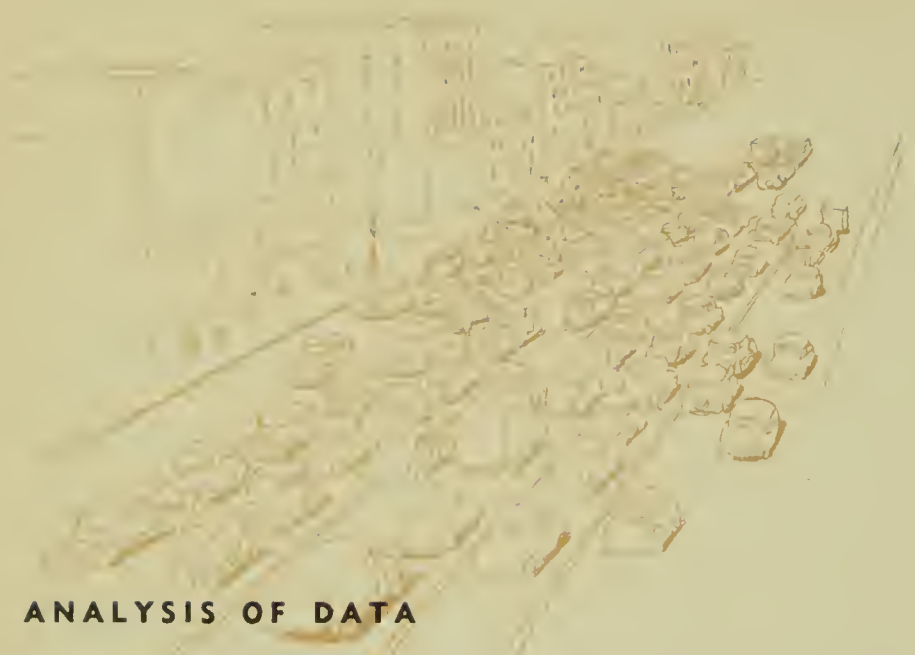
Qualified interviewers, specially trained for the work, visited apartment houses, private homes, rooming houses, hotels, institutions, hospitals and colleges in each section of the study area. They questioned the occupants concerning trips made by each member of the household on the preceding day, including travel by automobile, taxi, rapid transit, bus and train. At hotels, only permanent guests were interviewed, and at institutions only staff employees. The interviews were made on weekdays from Tuesdays through Saturdays and the interviewers obtained information on travel on the day preceding the interview. Interviews were conducted for the selected sample only and no substitutes were permitted.

The external survey determined the travel habits of persons entering the study area. On all roads intersecting the boundary around the study area and carrying significant volumes of traffic, passenger car, taxi and truck drivers were stopped and questioned as to their origins and destinations. Forty seven of the 105 roads that crossed the cordon carried 90 per cent of the daily traffic. Roadside interview stations were set up on these 47 highways and over 65 per cent of all vehicles that passed through these stations were stopped and interviewed on a typical weekday.

These two phases of study were carried on simultaneously from September 4, 1945 to December 15, 1945 for weekday travel only, Monday through Friday, and the data recorded at the roadside interview stations were correlated with the internal interview information.

*Accuracy of Survey*

A screen line was established to check the accuracy of the expanded interview data. The line selected started at the Sumner Tunnel, crossed the Charlestown district, the Warren and Prison Point Bridges, and then followed the Fitchburg Division of the Boston and Maine Railroad through Somerville, Cambridge and Belmont. Daily volume counts were made at each of the 21 roads crossing the screen line. These volumes were then compared with the probable traffic as derived from the expanded interview data. For the 16-hour period from 7:00 A.M. to 11:00 P.M. the interview accuracy was 91 per cent, which compares favorably with similar surveys in other cities.



## ANALYSIS OF DATA

The traffic data collected from the interviews make it possible to learn where people go, the time pattern of travel, the trip purposes, and the modes of transportation. Analysis of this information provides the basis for selecting route locations to best serve the traffic needs of the study area. Estimates can also be made of the traffic volumes which will use the various sections of the proposed routes as well as the use of proposed access facilities.

The traffic movement of vehicles and passengers is divided into four classes as follows:

Class 1 — Movement of all types of motor vehicles from one roadside interview station to another without a stop within the area.

Class 2 — Movement of all types of motor vehicles between roadside interview stations and zones.

Class 3 — Movement of all types of motor vehicles between zones.

Class 4 — Mass transportation passenger movement between zones.

The following tabulation shows a recapitulation of these classes:

| Means of Travel | Station to Station | Station to Zone | Zone to Zone | Total |
|---|---|---|---|---|
| **MOTOR VEHICLE TRIPS BY:** | | | | |
| Passenger Cars and Taxi | 7,715 | 154,883 | 467,148 | 629,746 |
| Trucks | 1,090 | 21,960 | 158,257 | 181,307 |
| Total Motor Vehicle Trips | 8,805 | 176,843 | 625,405 | 811,053 |
| **MASS TRANSPORTATION** | | | | |
| Boston Elevated Railway Company | | | | |
| Vehicles* | | | | 807,600 |
| Alone | | | 760,986 | |
| In Combination | | | 46,614 | |
| Independent Buses | | | | 123,534 |
| Alone | | | 117,591 | |
| In Combination | | | 5,943 | |
| Suburban Railroads | | | | 48,337 |
| Alone | | | 32,561 | |
| In Combination | | | 15,776 | |
| Total Mass Transportation | | | 979,471 | 979,471 |

* Now operated by Metropolitan Transit Authority.

### *Desire Lines of Travel*

From the data obtained on the various classes of traffic movement, desire lines of travel for all types of motor vehicles — passenger cars, taxis, and trucks — as well as Metropolitan Transit Authority and independent bus patrons, and suburban railroad passengers were prepared. A desire line can be defined as a straight line between the point of origin and the point of destination of a trip or group of similar trips, without regard to routes traveled, in other words the line of travel if a direct highway existed. These lines were drawn between roadside interview

stations, between roadside interview stations and the geographical center of zones, and between zones. In the preparation of charts showing desire lines of travel, the intra-zone trips are omitted because it is not feasible to show directional flow within a zone.

Major directional desire lines were prepared showing travel by all types of motor vehicles, by trucks only, by vehicles of the Metropolitan Transit Authority and by independent buses, and by suburban railroads. These major directional desire lines are shown on Plates 11, 12, 16 and 17, respectively. The bands do not show trip lengths, neither do they establish the exact location for traffic routes. They should not be confused with traffic flow charts which show actual or anticipated traffic on existing or proposed facilities. Each band is merely a grouping of the various desire lines having a like direction into a band showing that directional desire. The major directional desire lines form a basis for selection of the general location of expressways, street improvements, or rapid transit routes from the viewpoint of traffic service. The widths of the bands indicate the approximate volume of vehicles or passengers each route would attract. The bands are relative only and represent such trips as fall within rather close limits along the direction of the major desire lines of travel.

*Motor Vehicle Trips*

Appendix 1 shows the number of daily trips by all types of motor vehicles passing thru the study area from cordon to cordon, identified by station of entry.

Appendix 2 shows by types of motor vehicles the number of daily trips with origin or destination within the study area that crossed the cordon line and the stations thru which they passed.

In order to present a complete picture of the movement of all types of motor vehicles between zones, Appendix 3 gives a recapitulation of these data. The totals in this tabulation are sums of the actual daily expanded trips segregated into total inter and intra-zone trips, intra-zone trips and inter-zone trips for zones of the downtown area and all other zones.

*Mass Transportation Passenger Movement Between Zones*

The inter- and intra-zone travel by Boston El (now the Metropolitan Transit Authority), independent bus and suburban railroad represents 979,471 daily trips, divided as follows:

| | |
|---|---|
| Boston Elevated Railway Company's Vehicles | 807,600 |
| Independent Buses . . . . . | 123,534 |
| Suburban Railroad . . . . . | 48,337 |

Of these, 908,058, or 92.71 per cent, are inter-zone trips, while the remaining 71,413 or 7.29 per cent, are intra-zone trips. In order to show mass transportation passenger trips, which have origin or destination in zones of the downtown area separately from those that have origin and destination in other zones but must pass through the downtown area, these passenger trips have also been segregated into two groups, one showing the travel between downtown area and zones and the other between zones exclusive of the downtown area. See Plates 13 and 14.

The intra-zone passenger trips are not shown on the plates portraying Metropolitan Transit Authority, independent bus or railroad passenger travel.

Actual fare collections are known to be greater than the above figures indicate, just as screen line volume counts of vehicles were greater than volumes as derived by analysis of the home interview surveys. The patterns of transit traffic movement as revealed by these data are proportionately correct, however, and can be expanded accordingly. A summary of the survey data will be found in Appendix 4 which also recapitulates vehicular data.

The following tabulation shows a recapitulation of the movement between zones of mass transportation passengers, either by Metropolitan Transit Authority, independent buses or suburban railroads. These data are shown as total inter- and intra-zone trips, intra-zone trips alone and inter-zone trips alone for zones of the downtown area and for all other zones.

| Movement | Suburban Railroad | Bus | Boston El | Total |
|---|---|---|---|---|
| Inter- and Intra-Zone Trips Between Downtown Area and Other Zones | 39,076 | 5,775 | 413,973 | 458,824 |
| Inter- and Intra-Zone Trips Between Zones Exclusive of Downtown Area | 9,261 | 117,759 | 393,627 | 520,647 |
| *Total Inter- and Intra-Zone Trips* | 48,337 | 123,534 | 807,600 | 979,471 |
| Intra-Zone Trips — | | | | |
| Downtown Area | ..... | ..... | 1,407 | 1,407 |
| Downtown Area | | | | |
| Other Zones | 63 | 17,653 | 52,290 | 70,006 |
| *Total Intra-Zone Trips* | 63 | 17,653 | 53,697 | 71,413 |
| Inter-Zone Trips — Downtown Area and Other Zones | 38,971 | 5,775 | 391,797 | 436,543 |
| Inter-Zone Trips — | | | | |
| Downtown Area | 105 | ..... | 20,769 | 20,874 |
| Between Other Zones | 9,198 | 100,106 | 341,337 | 450,641 |
| *Total Inter-Zone Trips* | 48,274 | 105,881 | 753,903 | 908,058 |
| Intra-Area Trips — Downtown Area | 105 | ..... | 22,176 | 22,281 |

*Origins and Destinations*

In order to ascertain the movement of traffic within the study area, it is important to know the origin and destination of trips made in private vehicles and also those by mass transportation.

As a trip consists of a journey between an origin and a destination, the total number of origins and destinations within any area is twice the number of inter- and intra-zone trips plus the inter-area trips having either origin or destination within the area.

The total number of inter- and intra-zone trips for all types of motor vehicles within the study area was 625,405. This multiplied by two gives 1,250,810 origins and destinations within the study area to which must be added 176,843 inter-study area trips which have either an origin or destination within the study area making a grand total of 1,427,653 origins and destinations. As through trips do not have either origins or destinations within the study area, they are not included.

For mass transportation, origins and destinations are shown only for the zone to zone movement within the study area because it was not practicable to stop vehicles in this category at roadside interview stations for the purpose of interviewing passengers.

The total number of inter- and intra-zone daily Boston Elevated, independent bus and suburban railroad passenger trips within the study area was 979,471. This multiplied by two gives 1,958,942 origins and destinations within the study area.

Origins and destinations for all types of motor vehicles and for mass transportation by cities and towns will be found in Appendix 5 and Appendix 6, and graphically on Plates 18 and 19, respectively.

*Traffic to the Downtown Area*

Boston, like most other large cities, has serious traffic problems in the downtown area. From the data collected by the origin and destination survey, the residents have revealed where they want to go. Construction of new facilities or improvement of existing streets in the locations indicated by correct interpretation of these data will aid in the collection and dispersion of downtown traffic.

Congestion on the downtown streets will also be reduced to the extent that they are now overburdened, with traffic which will be over-passed or by-passed on the proposed expressways. Potentialities for relief as a result of this expedient are not as great as in the case in most other large cities.

An analysis of the data from the recent survey shows that 25.47 per cent of all the traffic in and out of the study area either goes through, into or moves within the downtown area of Boston. This traffic is divided as follows: 18.24 per cent had origin or destination in the business district, 1.85 per cent went thru without stopping, and 5.38 per cent of all trips made in the survey area had both origins and destinations in the downtown area. Only 16.9 per cent of the traffic entering downtown Boston could be by-passed.

The daily movement of all types of motor vehicles between zones of the entire study area plus the 47 roadside stations and zones of the downtown area is 147,925 daily trips, divided as follows: 117,984 daily trips between zones of the entire study area and the downtown area and 29,941 between roadside interview stations and the downtown area being 79.76 and 20.24 per cent, respectively, of the total daily trips.

In addition there are 43,666 daily trips made wholly within the downtown area and 15,002 trips pass thru the area without stopping. Therefore, a total of 206,593 motor vehicle trips had origin or destination within, or passed thru, the downtown area.

In order to portray graphically the movement between the downtown area and the various zones and roadside interview stations the entire study area was divided into seven areas radiating from downtown Boston.

Plates 20 to 26, inclusive, show graphically the dispersion of daily traffic between the downtown area and the various areas and roadside interview stations. Detailed information for each area and for a composite of all areas is given in Appendix 7.

The intra-zone travel of 43,666 daily trips within the downtown area is not shown on the plates nor in Appendix 7, neither is the through movement of 15,002 trips, or travel between interview stations.

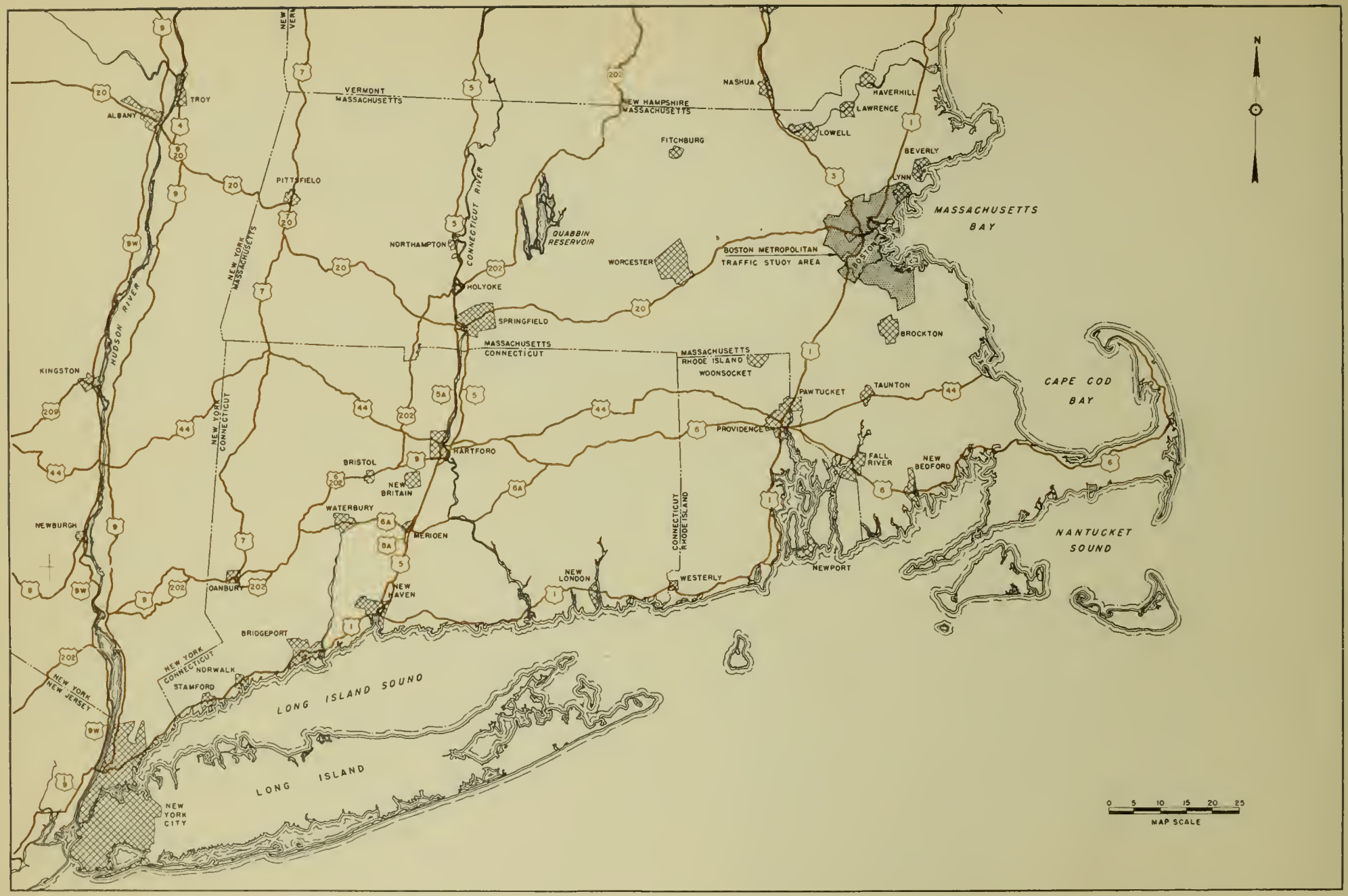
The greatest number of daily trips into the downtown area is from the west. The movement from this area is 42,127 daily trips or 28.48 per cent of the 147,925 daily trips. The least number of daily trips into the downtown area is from South Boston or Area 7. The movement from this area is 8,095 daily trips or 5.47 per cent.

The greatest number of daily trips from points outside the study area alone to the downtown area is from the northwest, and the fewest from the north.

*Supporting Data*

The traffic information presented briefly in the foregoing presentation and accompanying exhibits is supported not only by the basic data prepared by the Department of Public Works, Commonwealth of Massachusetts, but also by 18 thick volumes of tables summarizing and analyzing these data which were prepared by the consultants. These volumes should be carefully preserved, as they will prove of constant value in the implementing of the recommendations contained herein and in the detailed studies of other traffic problems which will be made in the future.

PLATE 1




## REGIONAL MAP

A MAP of the Boston Metropolitan Traffic Study Area with relation to the surrounding states showing U. S. numbered routes and the proposed interstate highway system.

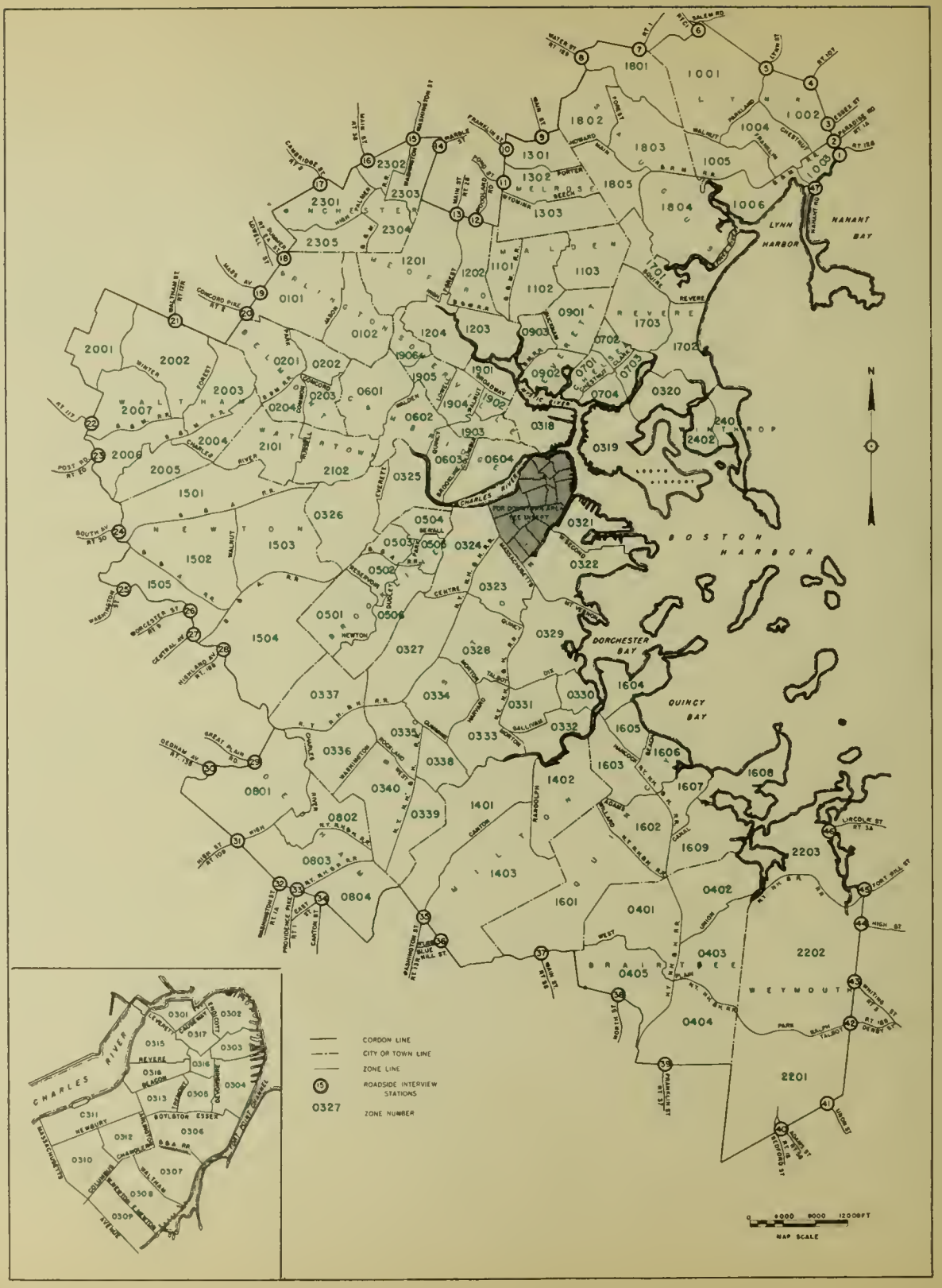
## MAJOR HIGHWAY MAP

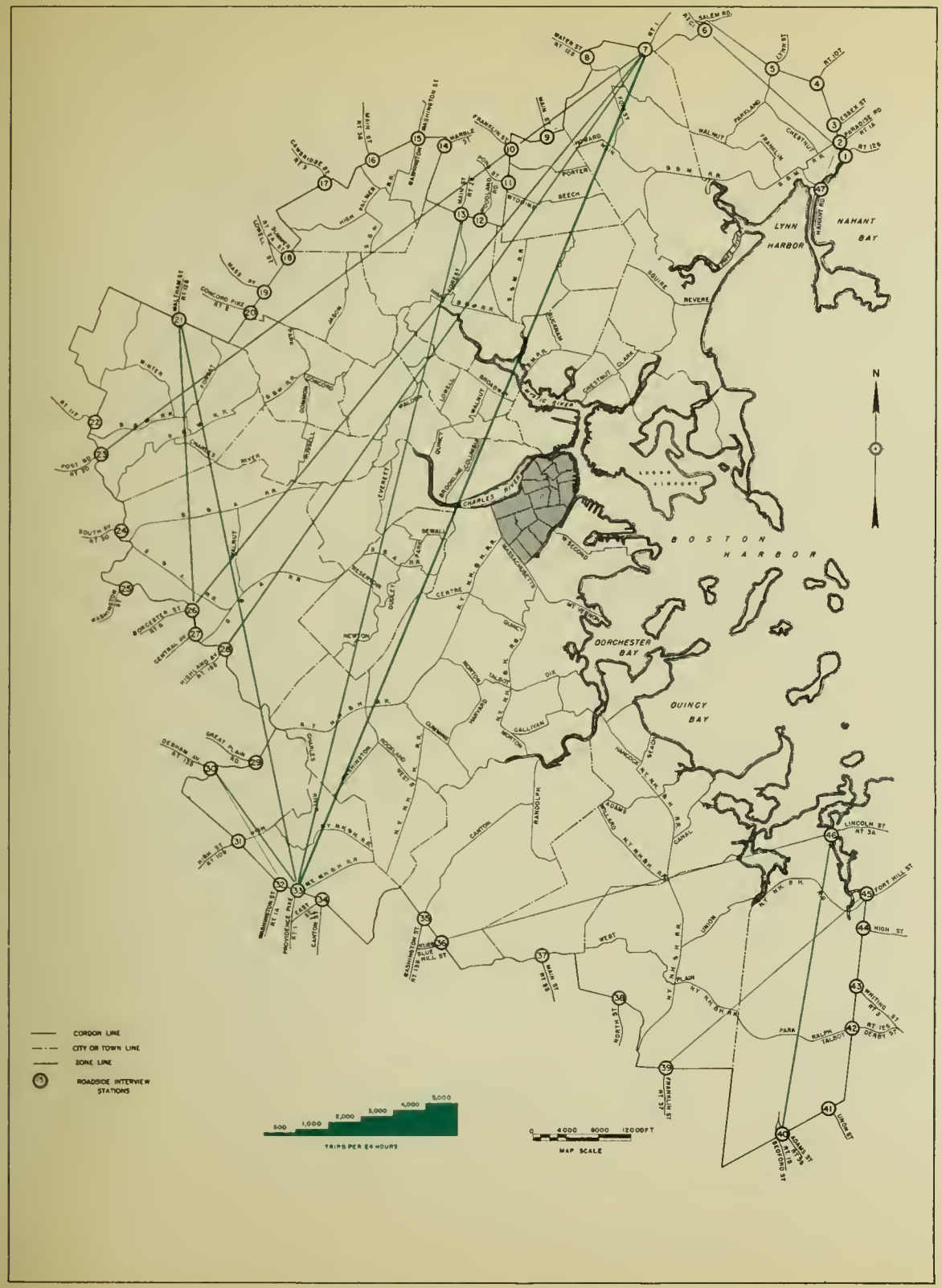
Cities and towns within twenty-five miles of the Origin and Destination Study Area showing important State highways.

## ZONE MAP

THE Boston Metropolitan Traffic Study Area subdivided into 138 zones.

The numbered zones on the map form the basis for the origin and destination study procedure. Also shown and identified by number are the 47 roadside interview stations where trip information was obtained from motor vehicle drivers entering and leaving the study area.

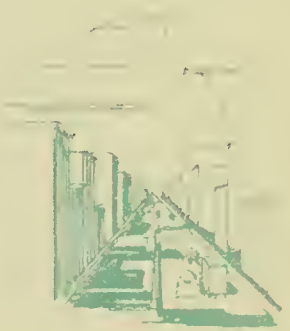





## DESIRE LINES

*All Types of Motor Vehicles — Thru Trips*

DESIRE lines of travel for all types of motor vehicles, in volumes of 100 trips or over per day, from one roadside interview station to another without stopping in the study area. Of a daily total of 8,805 such trips, 2,781 or 31.58 percent take place in groups of 100 or over and are therefore charted on the exhibit. The 8,805 thru trips across the study area from cordon to cordon represent only 1.09 percent of the 811,053 daily trips made thru to, from or within the study area. Of these thru trips, 7,715 or 86.62 percent represent passenger cars or taxis while the balance are made by trucks.

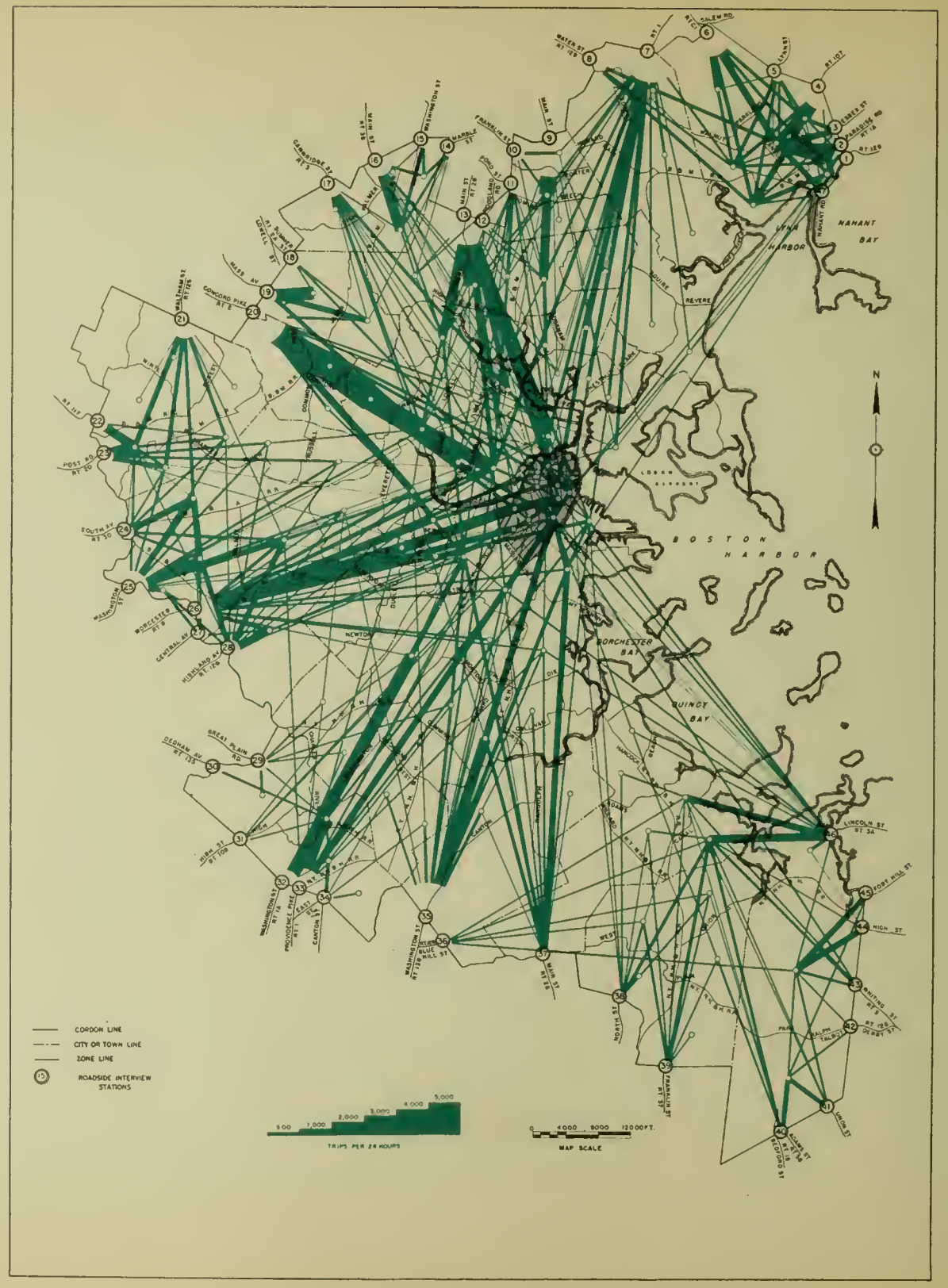


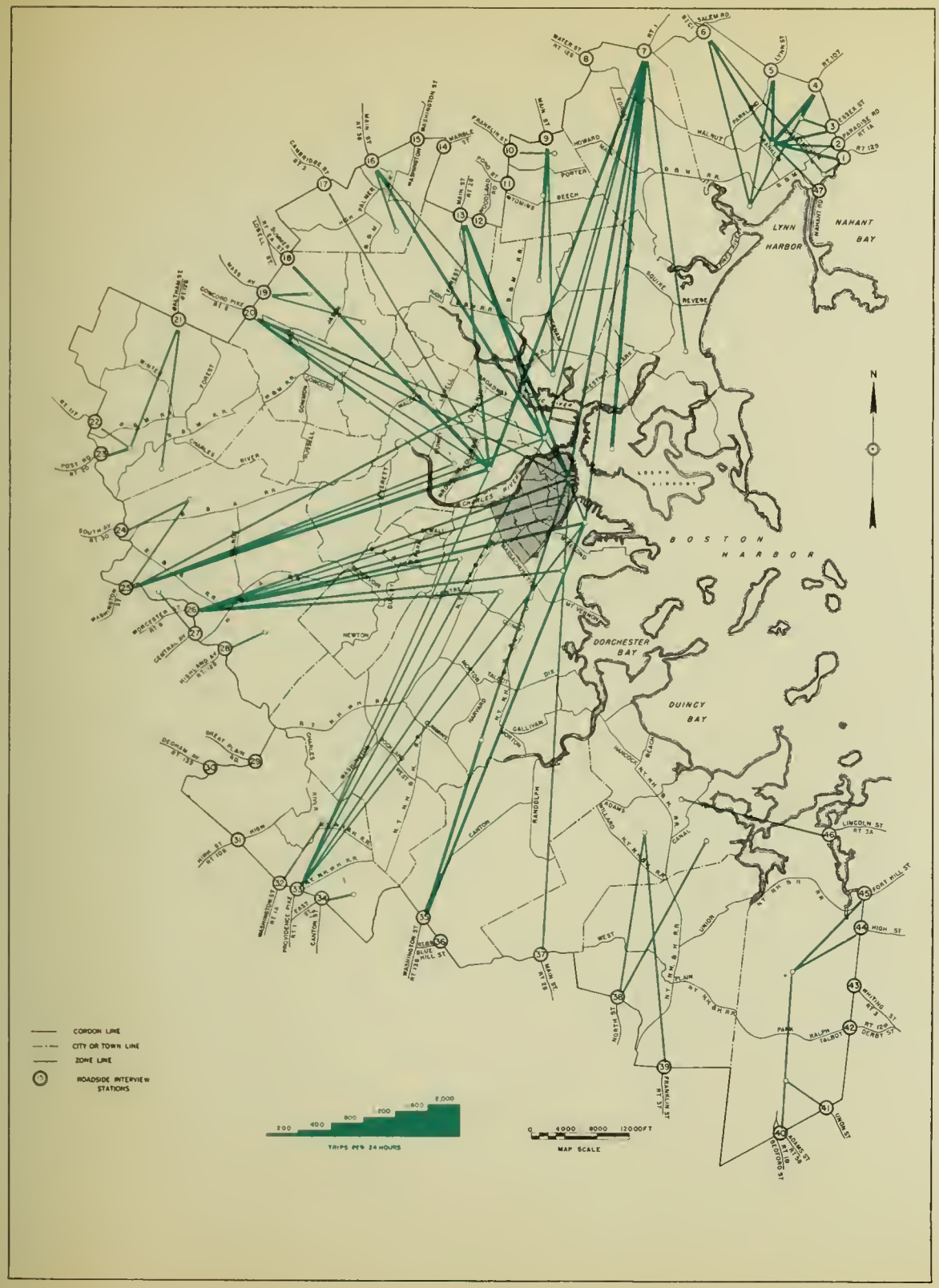
# DESIRE LINES

## *All Types of Motor Vehicles — Between Stations and Zones*

DESIRE lines of travel for all types of motor vehicles, in trip volumes of 100 and over per day, between roadside interview stations and zones. The bars represent 115,545 trips or 65.34 percent of the total 176,843 daily trips between roadside interview stations and zones. These 176,843 trips are only 21.80 percent of a total of 811,053 trips made daily in the study area. A directional breakdown by types of vehicles follows:

| Type of Vehicle | Between All Roadside Interview Stations and Zones | |
|---|---|---|
| | Volume | Percent of ( ) |
| All Types of Motor Vehicles . . | 176,843 (1) | 100.00 |
| Passenger Cars and Taxis . . . | 154,883 (2) | 87.58 (1) |
| Trucks . . . . . | 21,960 (3) | 12.42 (1) |
| | **Between Northern Roadside Interview Stations and Zones** | |
| All Types of Motor Vehicles . . | 89,092 | 50.37 (1) |
| Passenger Cars and Taxis . . . | 78,268 | 50.53 (2) |
| Trucks . . . . . | 10,814 | 49.24 (3) |
| | **Between Western Roadside Interview Stations and Zones** | |
| All Types of Motor Vehicles . . | 38,757 | 21.92 (1) |
| Passenger Cars and Taxis . . . | 34,025 | 21.97 (2) |
| Trucks . . . . . | 4,732 | 21.55 (3) |
| | **Between Southern Roadside Interview Stations and Zones** | |
| All Types of Motor Vehicles . . | 49,004 | 27.71 (1) |
| Passenger Cars and Taxis . . . | 42,590 | 27.50 (2) |
| Trucks . . . . . | 6,414 | 29.21 (3) |






## DESIRE LINES

*Trucks — Between Stations and Zones*

DESIRE lines of travel for trucks, in volumes of 50 trips and over per day, between roadside interview stations and zones. The bars represent 6,977 trips or 31.77 percent of a daily total of 21,960 truck trips and 3.95 percent of the 176,843 daily trips between roadside interview stations and zones. The 21,960 truck trips represent 3.85 percent of 181,307 daily truck trips thru, into and within the study area.

## DESIRE LINES

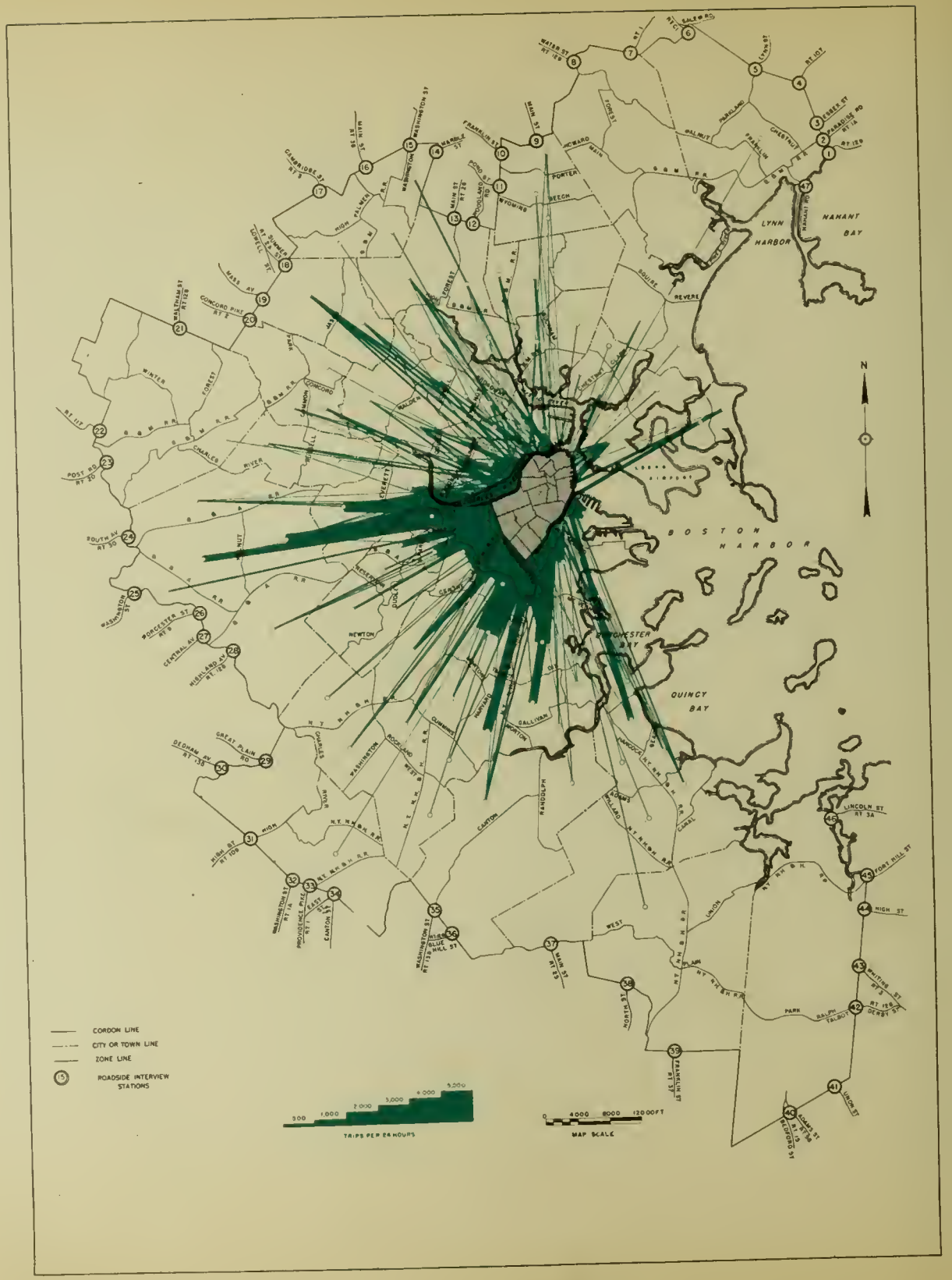
### *All Types of Motor Vehicles Between Zones and Downtown*

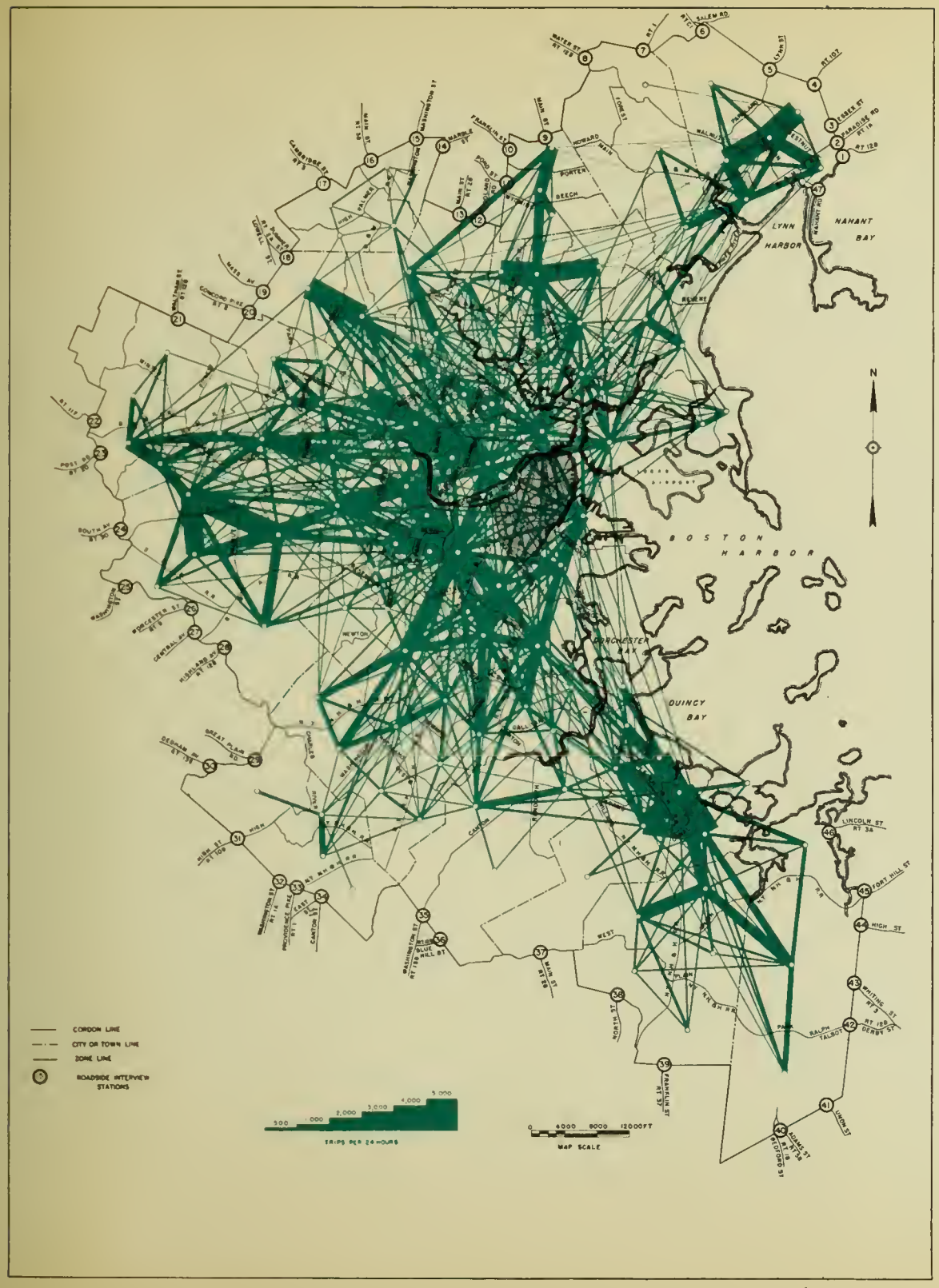
DESIRE lines of travel for all types of motor vehicles in volumes of 100 trips and over per day, for inter-zone trips between the downtown area and other zones. The lines represent 86,114 trips or 57.64 percent of 149,412 daily inter-zone trips between the downtown area and other zones. Not shown are 43,666 daily intra-area trips within the downtown area.

All inter- and intra-zone trips by all types of motor vehicles traveling within the study area represent 625,405 daily trips or 77.11 percent of the total 811,053 daily motor vehicle trips. Of the 625,405 daily trips, 515,940 or 82.50 percent, are inter-zone trips, while the balance are intra-zone trips. The inter-zone trips represent the major portion of the traffic moving in the study area and it is this traffic that the proposed system of expressways is intended to serve.

The intra-zone trips are omitted from the plates showing the desire lines of travel for zone to zone movement because it was not feasible to show the directional flow within a zone.

In order to show movements which have origin or destination in the zones of the downtown area separately from those which have origin or destination in other zones but must pass through the downtown area, the desire lines of travel portraying the zone to zone movement have been divided into groups — one showing the travel between the downtown area and zones, and the other between zones exclusive of the downtown area.






## DESIRE LINES

*All Types of Motor Vehicles*
*Between Zones*
*(Exclusive of Downtown)*

DESIRE lines of travel for all types of motor vehicles, in trip volumes of 100 trips and over per day, for inter-zone trips between zones other than those in the downtown area. The lines represent 294,888 trips or 80.45 percent of 366,528 daily inter-zone trips between zones other than those in the downtown area. Not shown are 109,465 daily intra-zone trips within the study area, 12,238 of which were in the downtown area.

Of the 515,940 daily inter-zone trips within the entire study area 117,984, or 22.87 percent, were between the downtown area and other zones, 31,428, or 6.09 percent, were between zones of the downtown area, while the balance was between zones, exclusive of the downtown area. See Appendix 3.

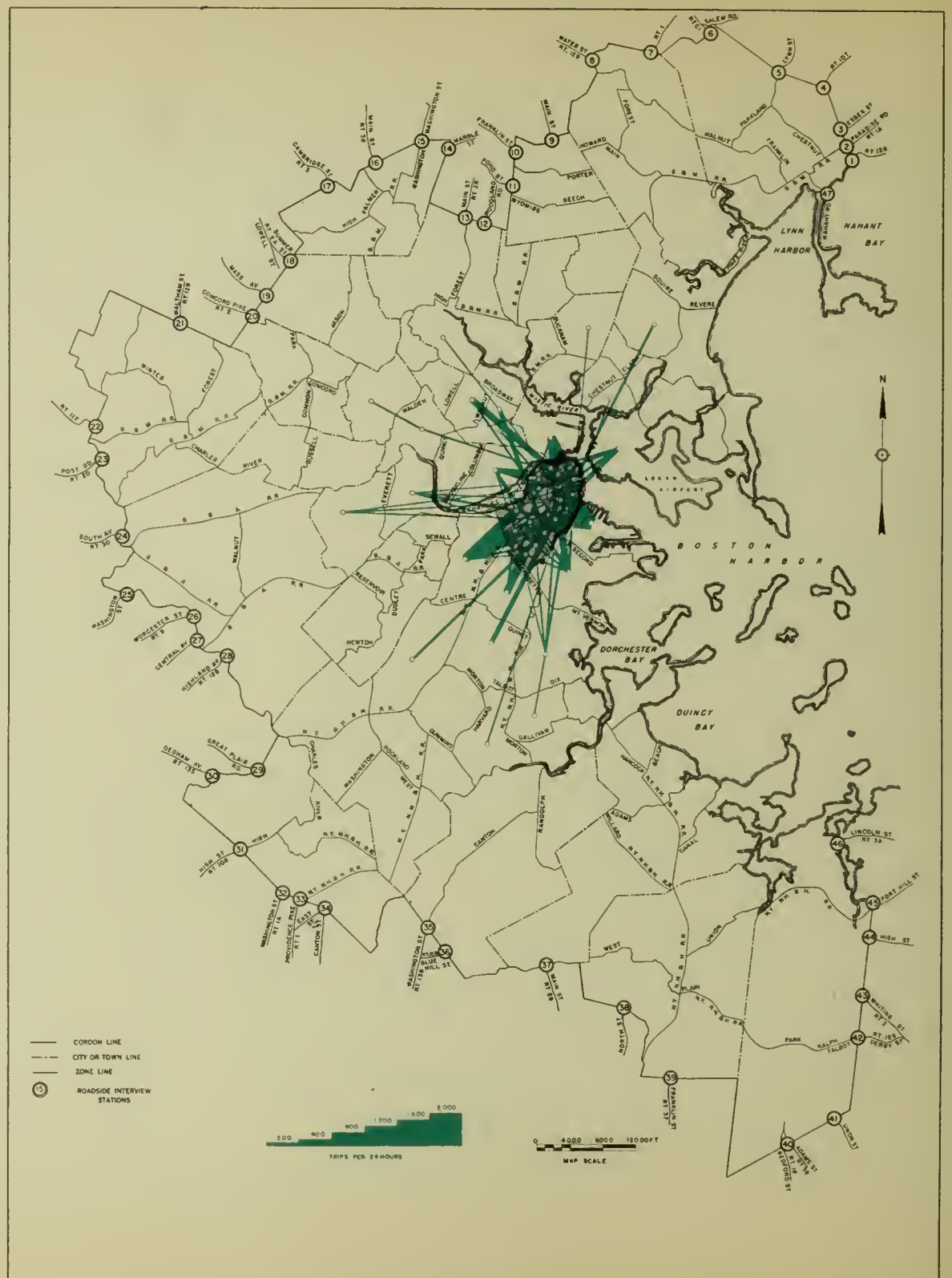
## DESIRE LINES

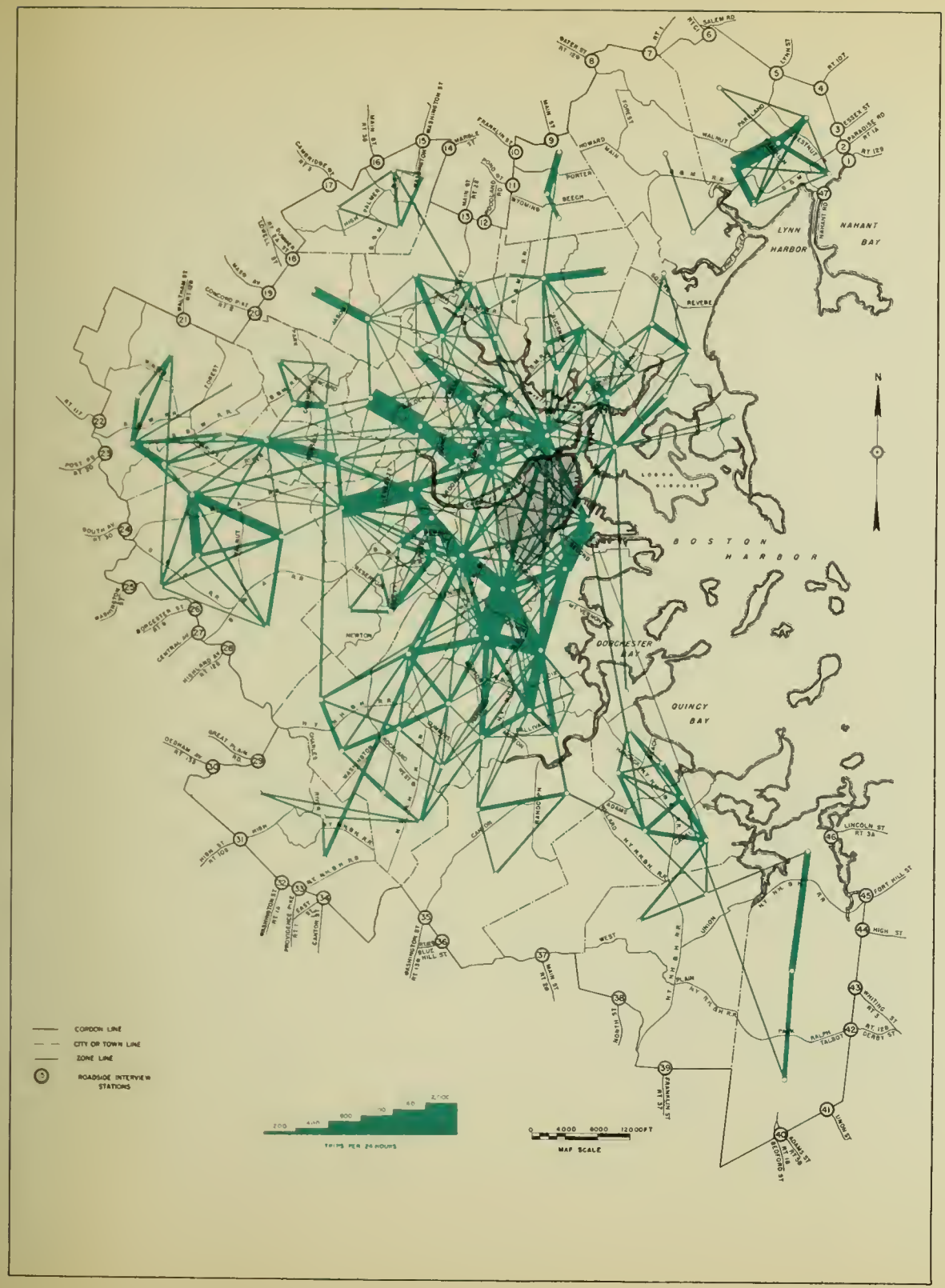
*Trucks*
*Between Zones and Downtown*

DESIRE lines of travel for trucks, in trip volumes of 50 trips and over per day, for inter-zone trips between the downtown area and other zones. The lines represent 14,590 trips or 41.55 percent of the 35,112 daily inter-zone truck trips between the downtown area and other zones. Not shown are 22,450 daily intra-area truck trips within the downtown area.

All inter- and intra-zone trips by trucks traveling within the study area represent 158,257 trips or 25.30 percent of the total 625,405 daily trips. Of the 158,257 daily trips 114,707, or 72.48 percent, are inter-zone trips while the balance are intra-zone trips.

Of the 114,707 daily inter-zone trips 21,232, or 18.51 percent, were between zones of the downtown area and other zones, 13,880 or 12.10 percent were between zones of the downtown area while the remaining 79,595 daily trips, or 69.39 percent, were between zones exclusive of the downtown area. Of the 43,550 intra-zone trips, 8,570 were in the downtown area.






## DESIRE LINES

*Trucks — Between Zones*
*(Exclusive of Downtown)*

DESIRE lines of travel for trucks, in volumes of 50 trips and over per day, for inter-zone trips between zones other than those in the downtown area. The lines represent 59,862 trips or 75.21 percent of the total 79,595 daily inter-zone truck trips between zones other than those in the downtown area. Not shown are 34,980 daily intra-zone truck trips within the study area.

# MAJOR DESIRE LINES

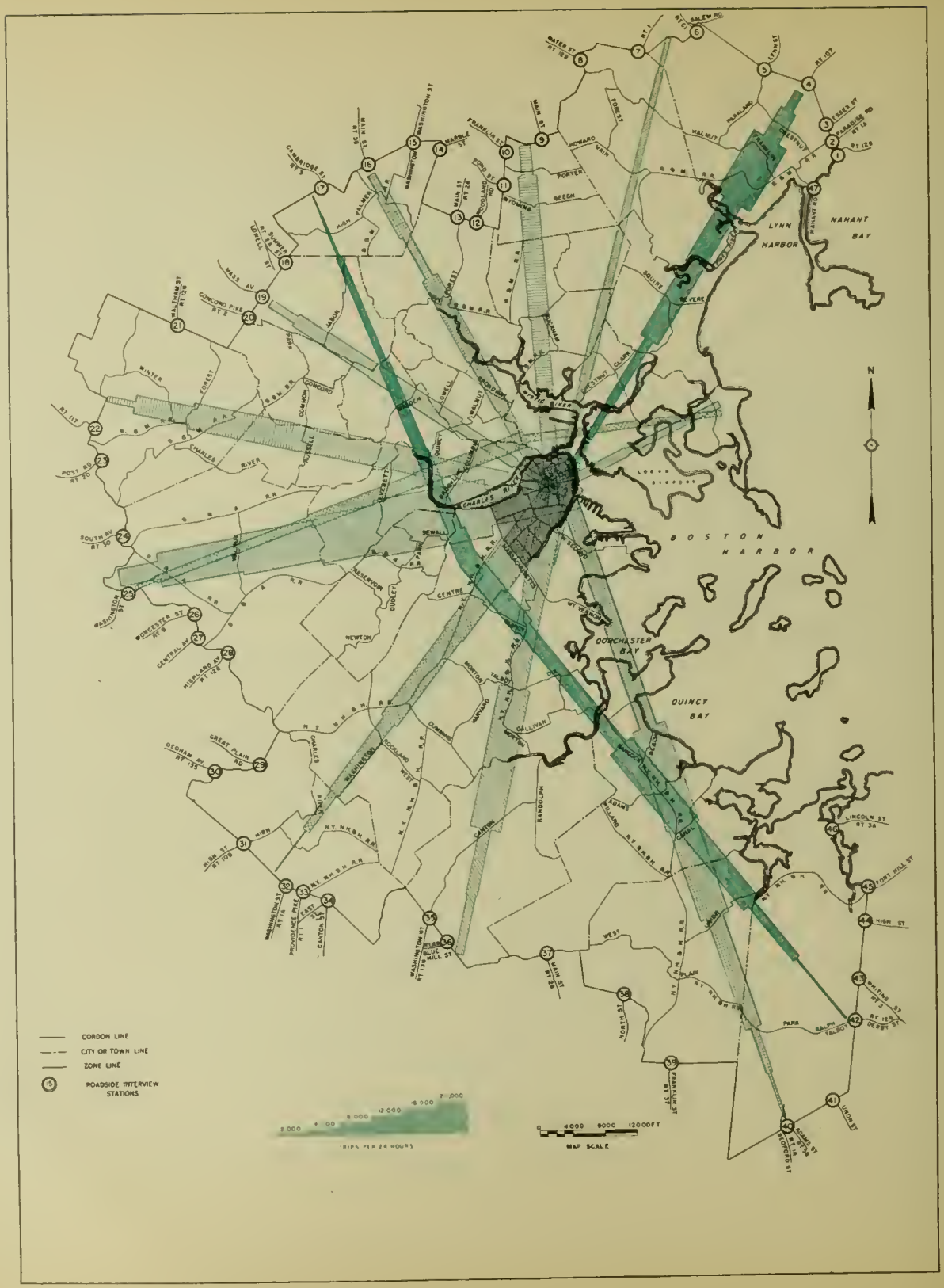
## *All Types of Motor Vehicles*

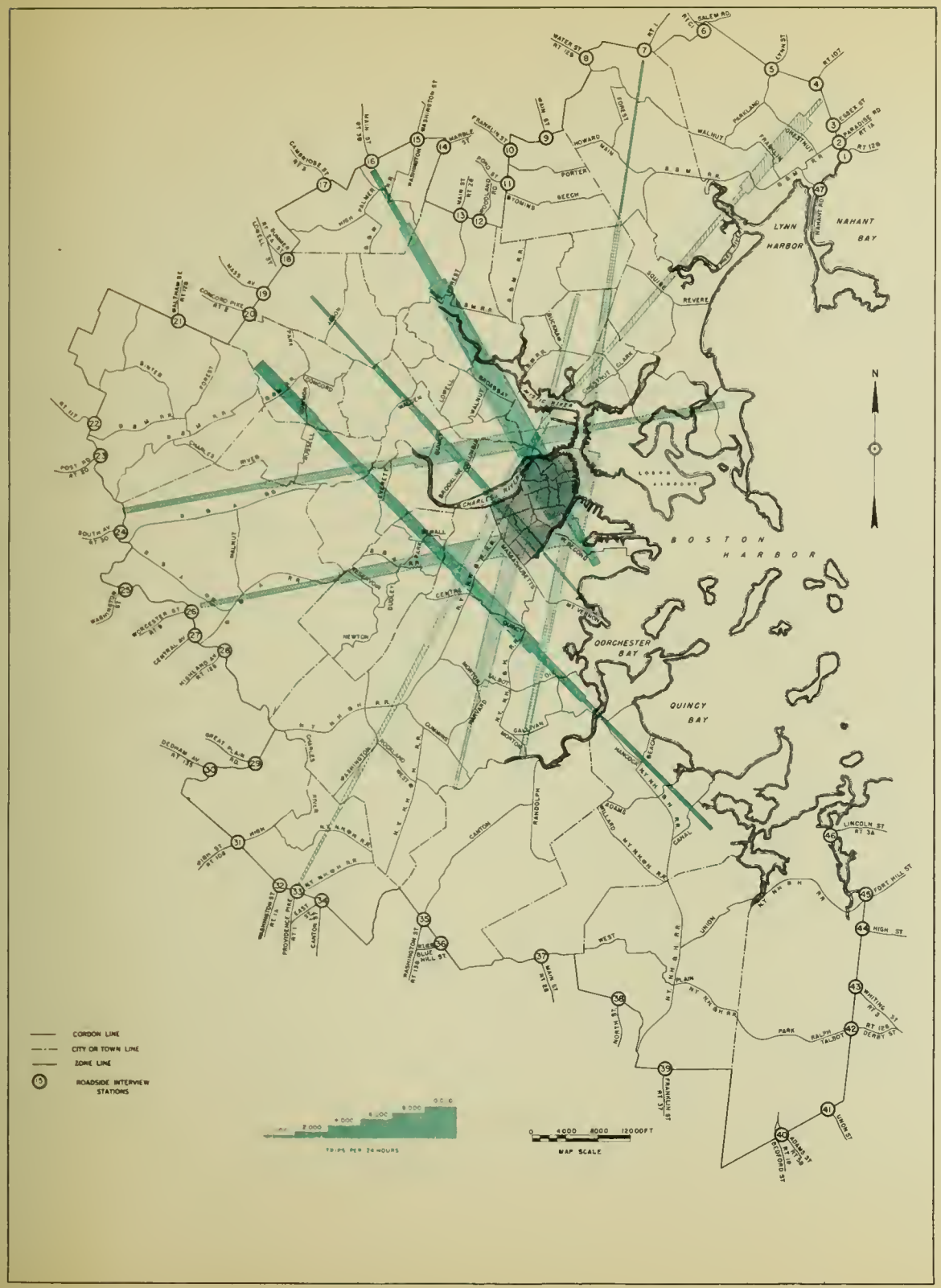
MAJOR directional desire lines of travel for all types of motor vehicle trips, internal and external. The volumes as shown by width of bands are relative only and represent such trips as fall within rather close limits of these directional lines. The 13 major desire lines shown represent 371,680 trips divided as follows:

| | |
|---|---|
| Between roadside interview stations | 1,533 |
| Between roadside interview stations and zones | 66,063 |
| Inter-zone trips | 304,084 |
| Total | 371,680 |

This volume represents 52.98 percent of 701,588 daily trips made through, into and within the study area, exclusive of intra-zone movement, for all types of motor vehicles.

These bands do not show trip lengths nor do they establish the most feasible location for traffic facilities. Each band is merely a grouping of the various desire lines along a like direction, into a band showing that directional desire.






# MAJOR DESIRE LINES

## *Trucks*

MAJOR directional desire lines of travel for truck trips, both internal and external. The volumes as shown by width of bands are relative only and represent such trips as fall within rather close limits of these directional lines. The eight major desire lines shown on the plate represent 98,041 trips divided as follows:

| | |
|---|---|
| Between roadside interview stations . . | 40 |
| Between roadside interview stations and zones . . . . . | 6,554 |
| Inter-zone trips . . . . . | 91,447 |
| Total | 98,041 |

This volume represents 71.17 percent of 137,757 daily truck trips made thru, into and within the study area, exclusive of intra-zone movement.

These bands do not show trip lengths nor do they establish the most feasible locations for traffic routes. As on Plate 11 each band is merely a grouping of the various desire lines, along a like direction, into a band showing that directional desire.

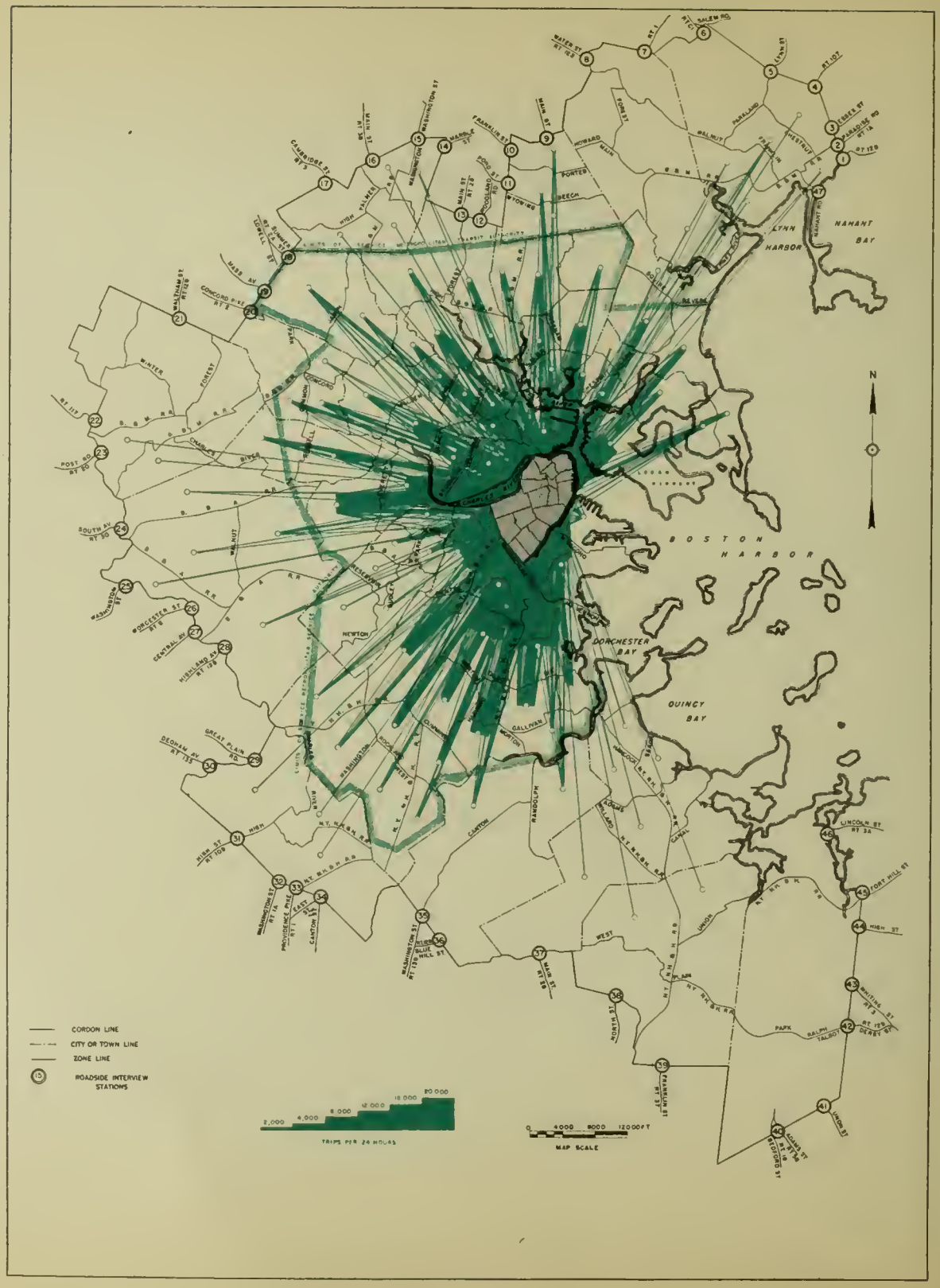
# DESIRE LINES

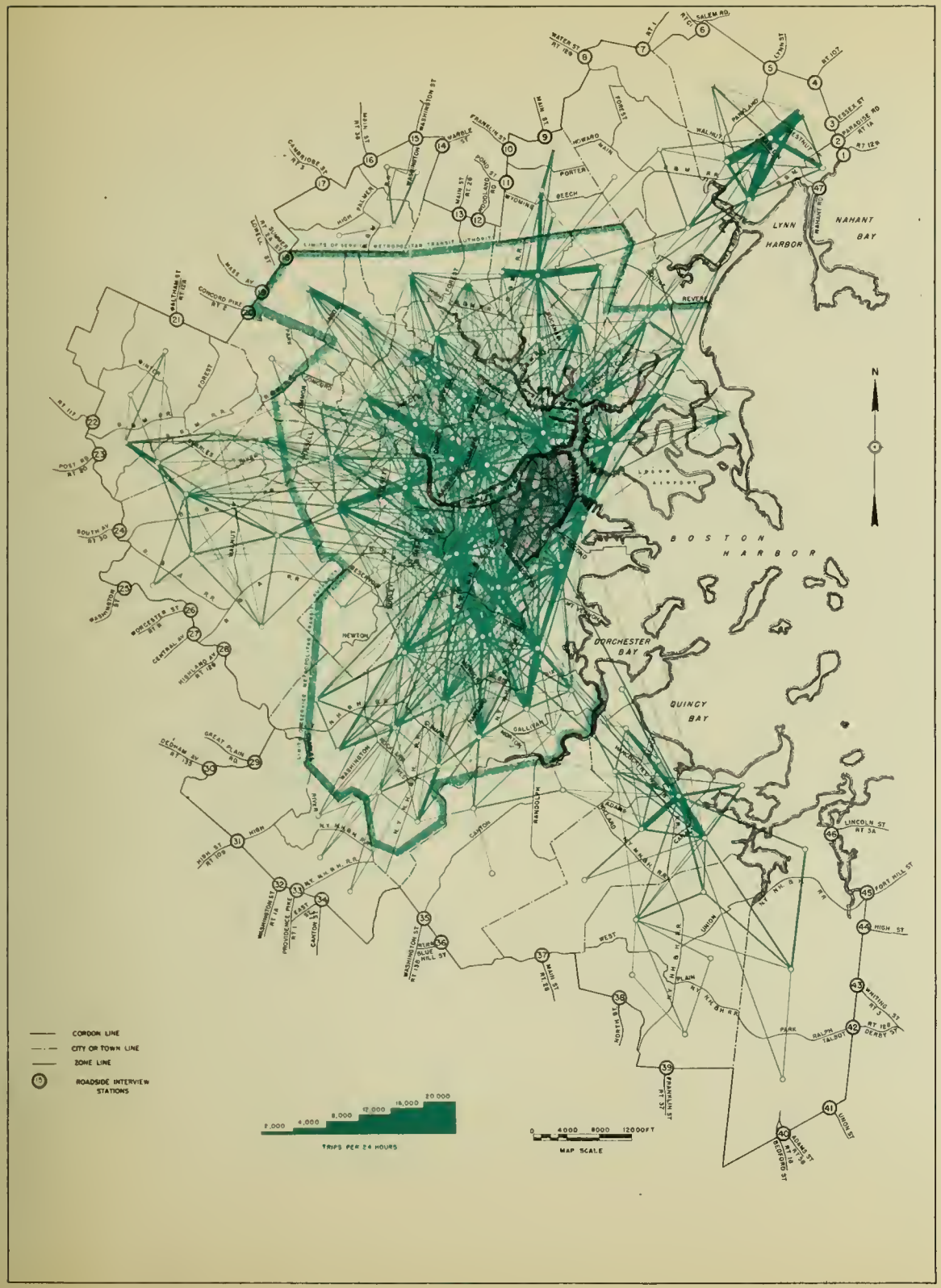
## *Mass Transportation Between Zones and Downtown*

DESIRE lines of travel for Boston Elevated Railway Company (now Metropolitan Transit Authority) and independent bus passengers, in volumes of 100 trips and over per day, for inter-zone trips between the downtown area and other zones. The lines represent 378,890 trips or 95.30 percent of 397,572 daily inter-zone Boston El and independent bus passenger trips between the downtown area and other zones. The plate does not show the 22,176 daily intra-area Boston El passenger trips within the downtown area.

The following table classifies trips by public transportation, other than suburban railroads which account for only 4.94 percent of the total:

| | Number and Percent of Transit Trips | |
|---|---|---|
| | Boston Elevated | Independent Bus |
| Total (Including Railroad) | 979,471 (1) | |
| Inter- and Intra-Zone | 807,600 (2)<br>82.45% of (1) | 123,534 (4)<br>12.61% of (1) |
| Inter-Zone | 753,903 (3)<br>93.35% of (1) | 105,881 (5)<br>85.71% of (4) |
| Between Downtown and other Zones | 391,797<br>51.97% of (3) | 5,775<br>5.45% of (5) |
| Between Zones Exclusive of the Downtown | 341,337<br>45.27% of (3) | 100,106<br>94.55% of (5) |
| Between Zones of Downtown Area | 20,769<br>2.75% of (3) | ----------<br>---------- |
| Intra-Zone | | |
| Downtown Area | 1,407 | ---------- |
| Other | 52,290 | 17,653<br>14.29% of (4) |






## DESIRE LINES

*Mass Transportation*
*Between Zones — Exclusive of Downtown*

DESIRE lines of travel for Boston Elevated and independent bus passengers, in volumes of 100 trips and over per day, for inter-zone trips between zones other than those in the downtown area. The lines represent 403,328 passenger trips or 91.37 percent of 441,443 daily passenger inter-zone trips between zones other than in the downtown area. There are 69,943 daily passenger intra-zone trips within the study area which are not shown.

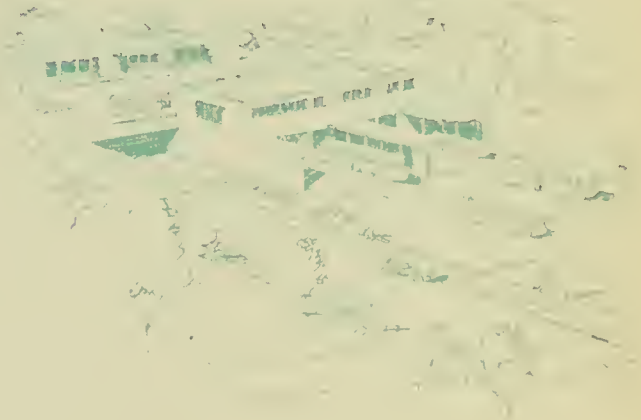


PLATE 15

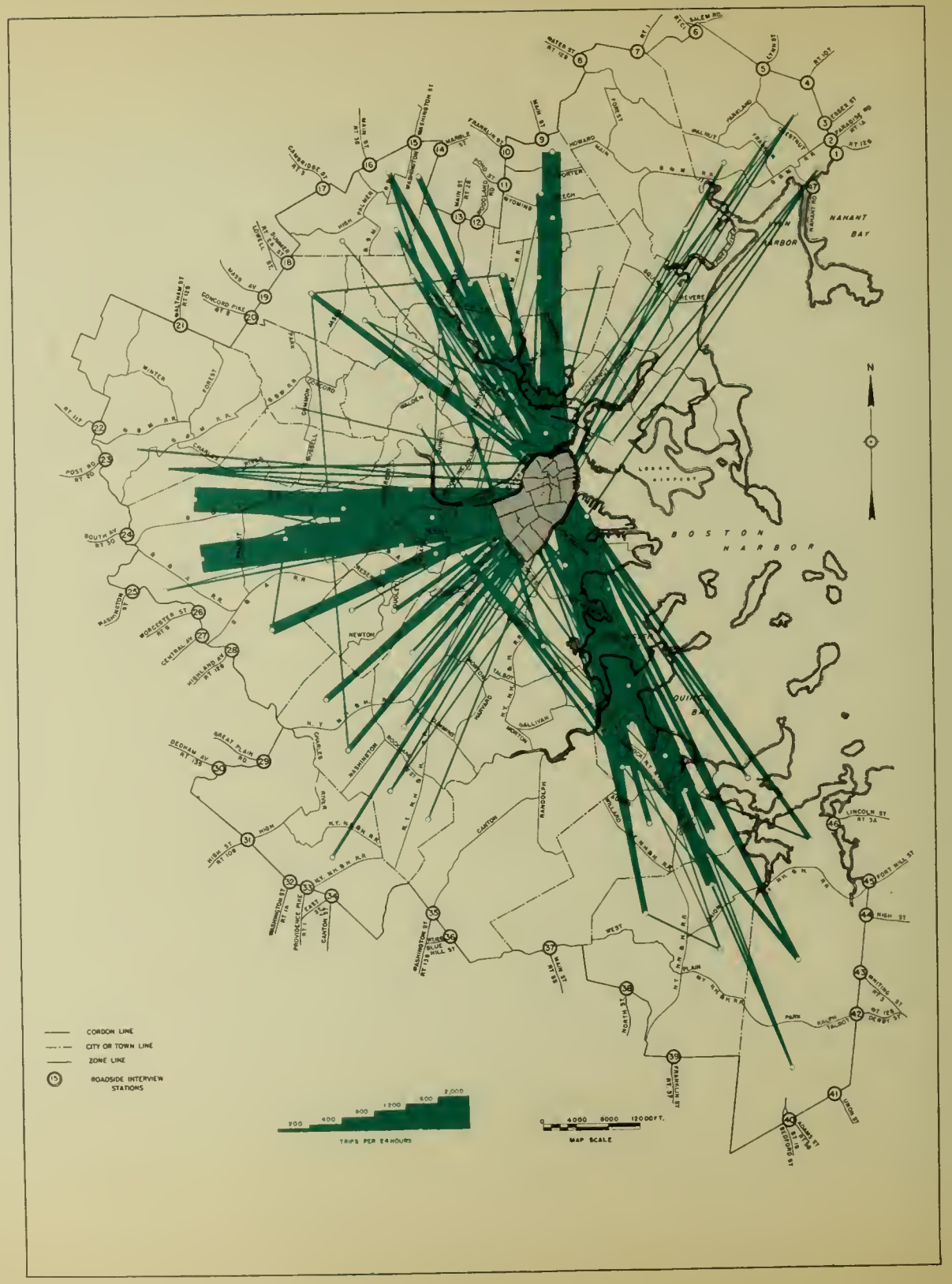
# DESIRE LINES

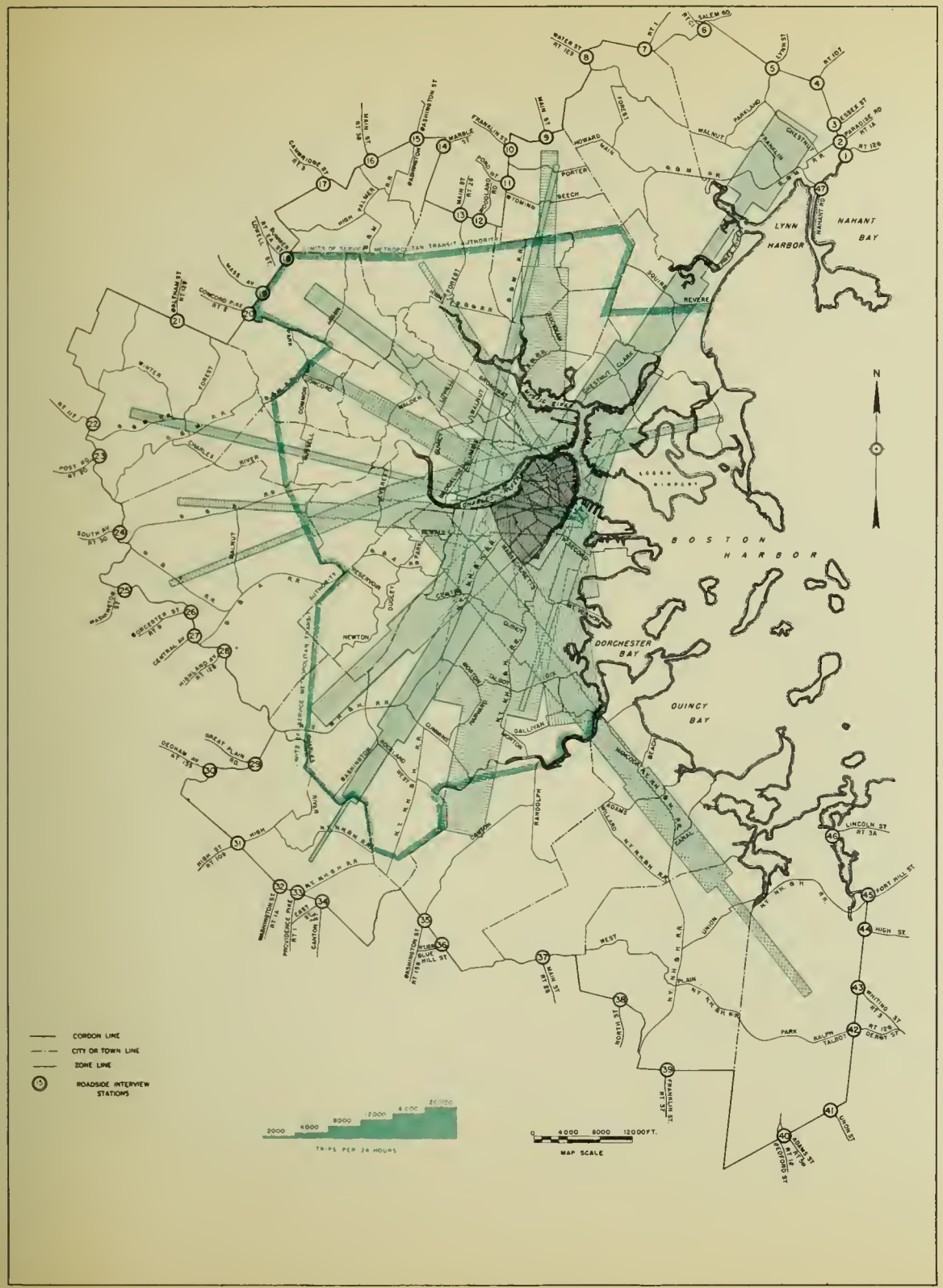
## *Railroad Passengers*

DESIRE lines of travel for railroad passengers, in volumes of 50 trips and over per day, for inter-zone trips. The lines represent 37,184 passenger trips or 77.03 percent of 48,274 daily inter-zone railroad passenger trips.

Of the 48,274 daily inter-zone trips, 38,971 or 80.73 percent were between zones of the downtown area and other zones, 105 or 0.22 percent, were between zones of the downtown area, while the remaining 9,198 or 19.05 percent, were between zones exclusive of the downtown area. There were no intra-area trips within the downtown area.

All inter- and intra-zone trips by railroad passengers represent 48,337 daily trips or 4.94 percent of the total 979,471 daily trips by mass transportation. Of the 48,337 railroad passenger trips 48,274 or 99.87 percent, are inter-zone trips, while only 63 are intra-zone trips.






# MAJOR DESIRE LINES

## *Mass Transportation*

A COMPOSITE map showing major directional desire lines of travel for Boston Elevated and independent bus passengers. The volumes as shown by width of bands are relative only and represent such passenger trips as fall within rather close limits of these directional lines. The 12 major desire lines shown on the plate represent 485,132 trips divided as follows:

| | |
|---|---|
| Boston Elevated . . . . . | 414,307 |
| Independent Bus . . . . . | 70,825 |
| Total | 485,132 |

This volume represents 56.42 percent of the total 859,784 daily Boston Elevated and independent bus passenger trips made within the study area, exclusive of intra-zone movement.

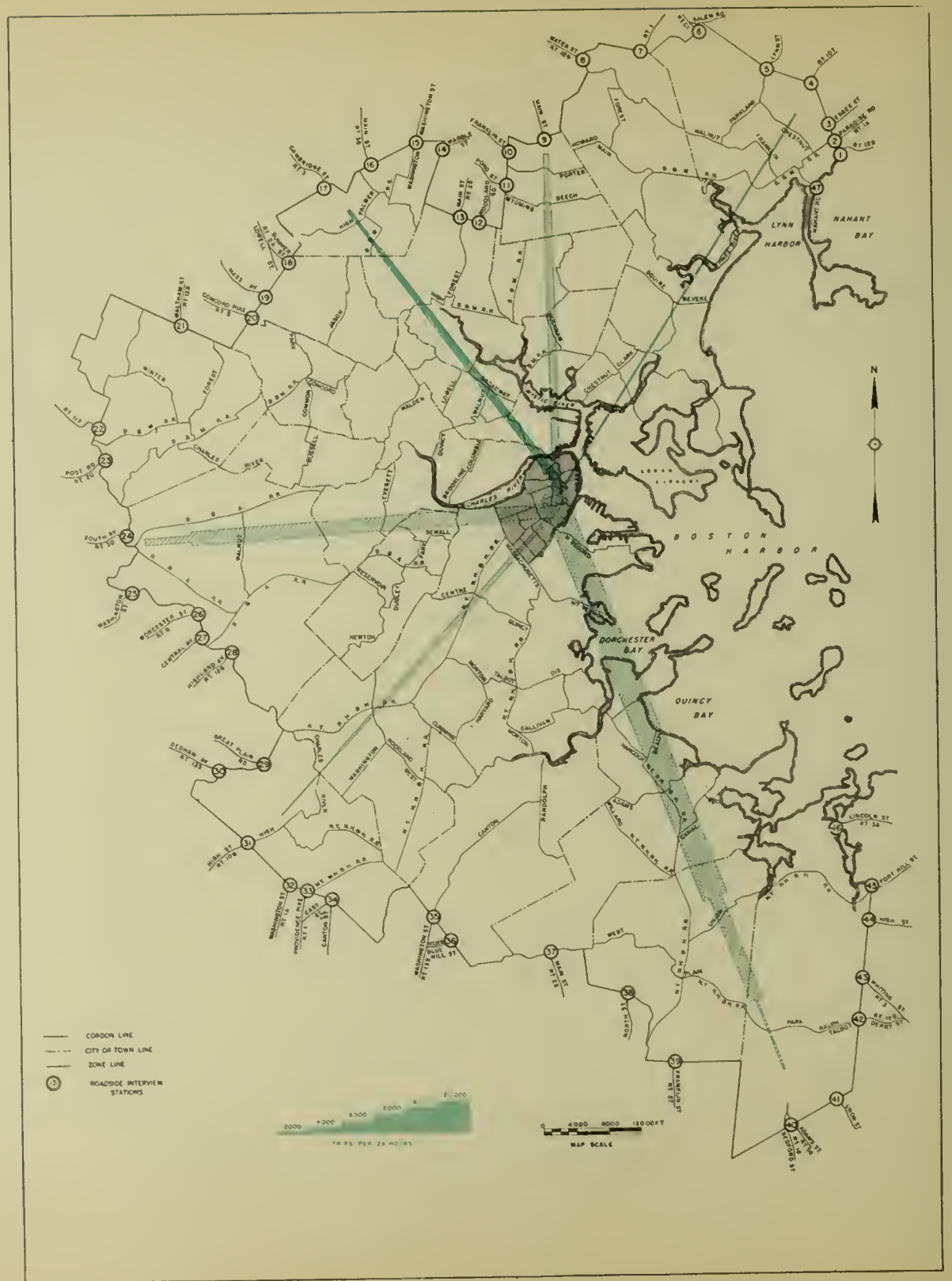
These bands do not show trip lengths nor do they indicate exact locations of Boston Elevated or independent bus routes. Each band is merely a grouping of the various desire lines, along a like direction, into a band showing that directional desire.

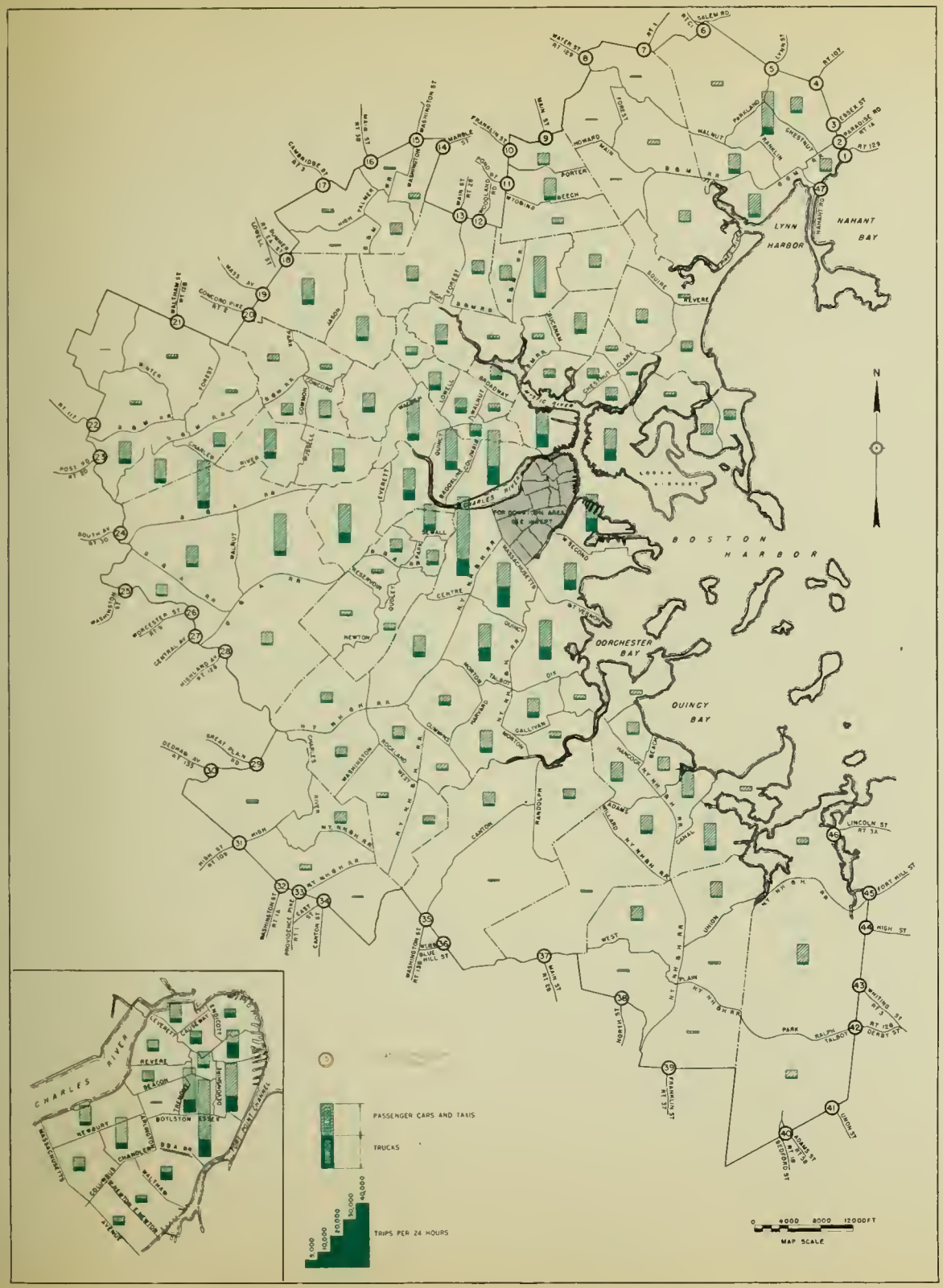
# MAJOR DESIRE LINES

*Railroad Passengers*

A COMPOSITE map showing major directional desire lines of travel for railroad passengers. The volumes as shown by width of bands are relative only and represent such passenger trips as fall within rather close limits along the direction of the major desire lines. The six major desire lines represent 41,995 daily inter-zone trips which is 86.99 percent of 48,274 daily railroad passenger trips made within the study area.

These bands do not show trip lengths nor do they establish the most feasible location for transportation routes. Each band is merely a grouping of the various desire lines, along a like direction, into a band showing that directional desire.






# ORIGINS AND DESTINATIONS BY ZONES

*All Types of Motor Vehicles*

PRESENTATION of the number of all types of motor vehicles that have origins and destinations in each zone.

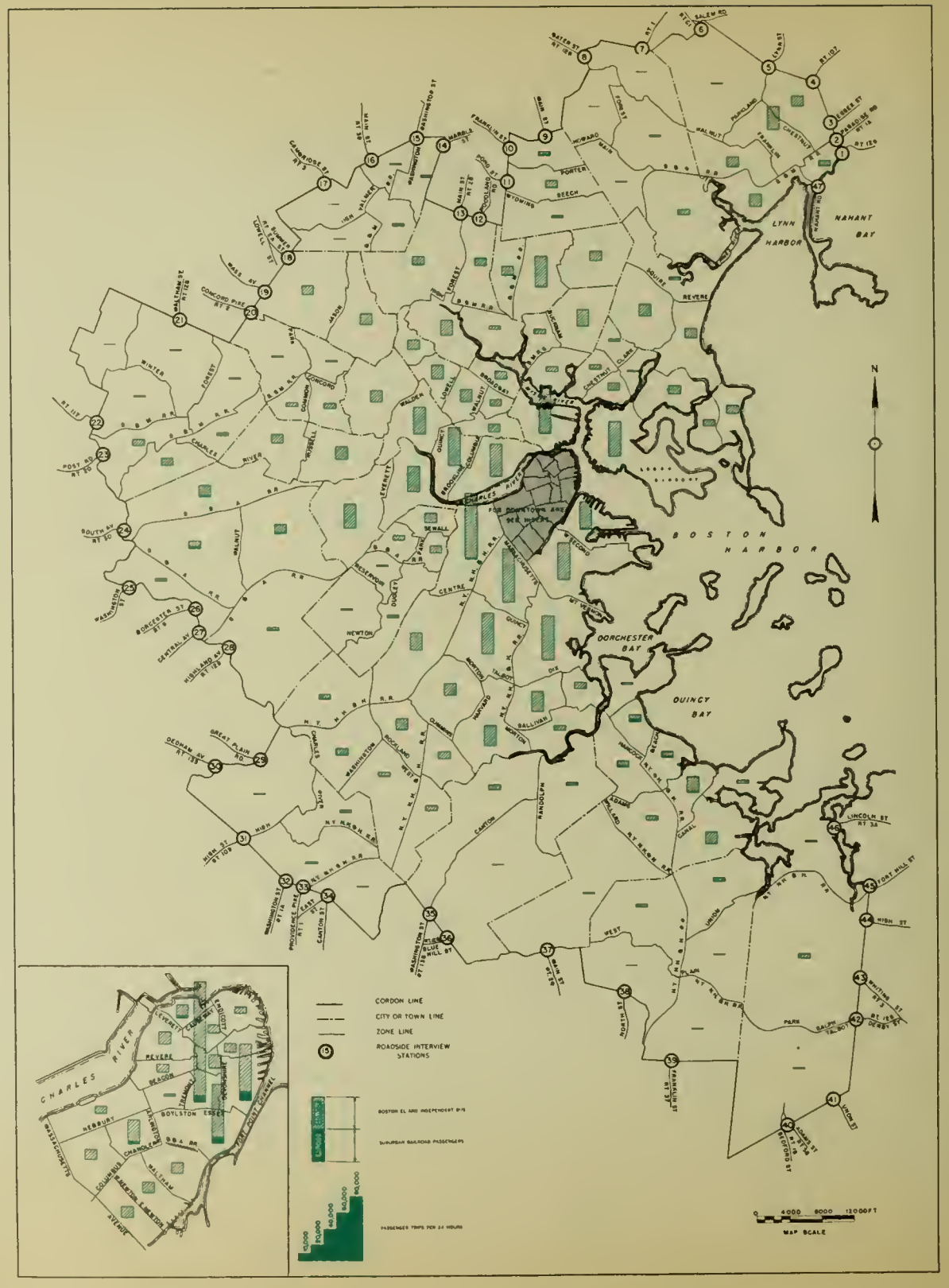
The length of each bar represents to scale the total number of daily origins and destinations for all types of motor vehicles, the solid lower portion representing the number of daily truck trips with origins and destinations in each zone.

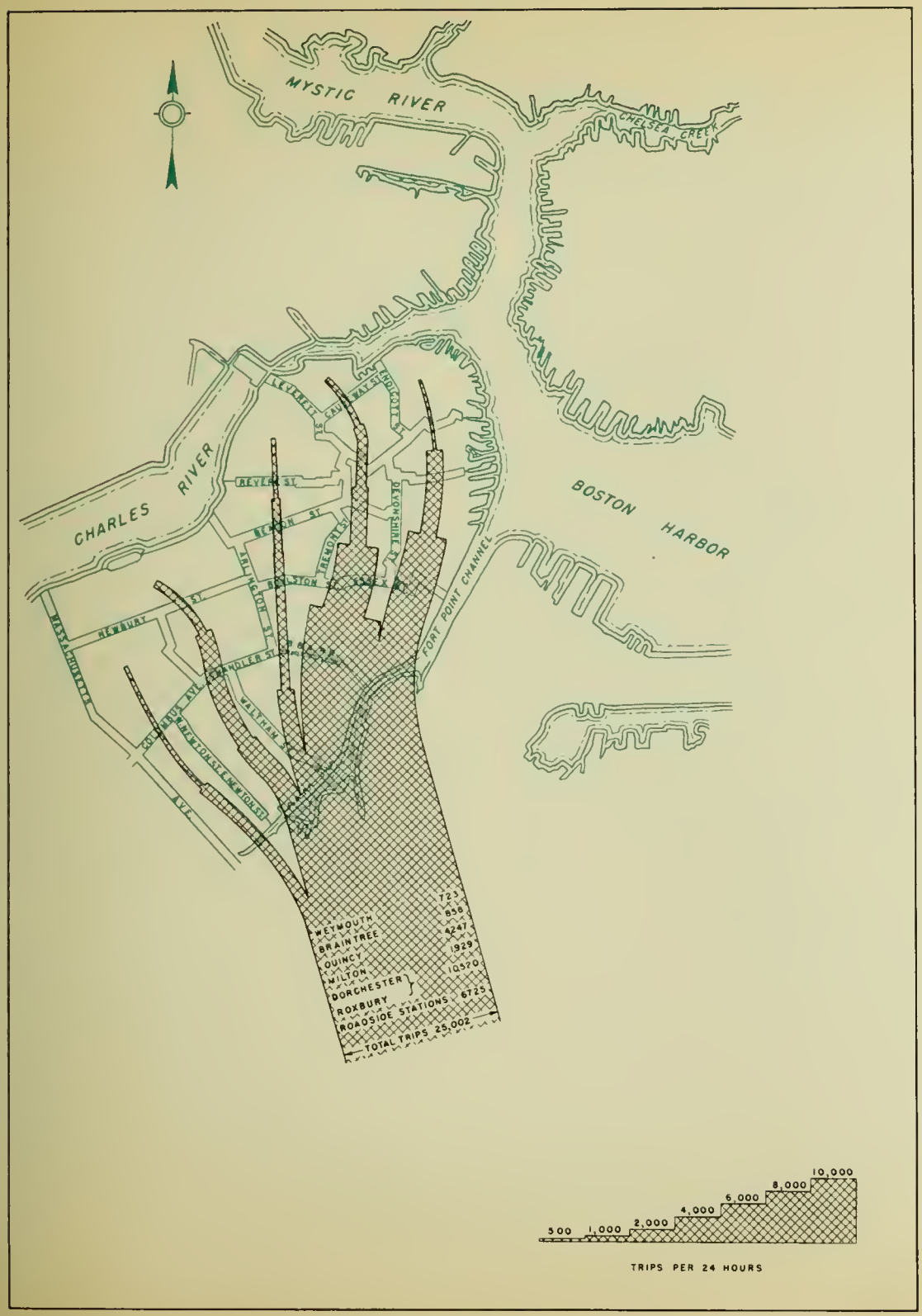
# ORIGINS AND DESTINATIONS BY ZONES

*Mass Transportation*

GRAPHIC presentation of the number of Boston Elevated and independent bus and railroad passengers that have origins and destinations in each zone.

The length of each bar represents to scale the total number of daily origins and destinations for Boston Elevated, independent bus, and railroad passengers, while the solid lower portion of each bar represents the total daily origins and destinations by railroad passengers alone.






# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 1

*All Types of Motor Vehicles*

DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and Weymouth, Braintree, Quincy, Milton, Dorchester, and Roxbury plus the trips between the downtown area and the 12 roadside interview stations located at the boundary lines of these localities.

The greatest width of the band represents to scale 25,002 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

The locations of the 12 roadside interview stations and movement between these stations and the downtown area are as follows:

| Station Number | Location | Located at Boundary of | Trips | Percent |
|---|---|---|---|---|
| 35 | Route 138 | Milton | 1,749 | 26.01 |
| 36 | Route 128 | Milton | 90 | 1.34 |
| 37 | Route 28 | Quincy | 1,588 | 23.61 |
| 38 | North Street | Randolph | 452 | 6.72 |
| 39 | Route 37 | Braintree | 189 | 2.81 |
| 40 | Route 18 | Weymouth. | 401 | 5.96 |
| 41 | Union Street | Weymouth | 239 | 3.55 |
| 42 | Route 128 | Weymouth | 139 | 2.07 |
| 43 | Route 3 | Weymouth | 502 | 7.47 |
| 44 | High Street | Weymouth | 56 | 0.83 |
| 45 | Fort Hill Street | Hingham | 85 | 1.26 |
| 46 | Route 3A | Weymouth | 1,235 | 18.37 |
| | | Total | 6,725 | 100.00 |

# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 2

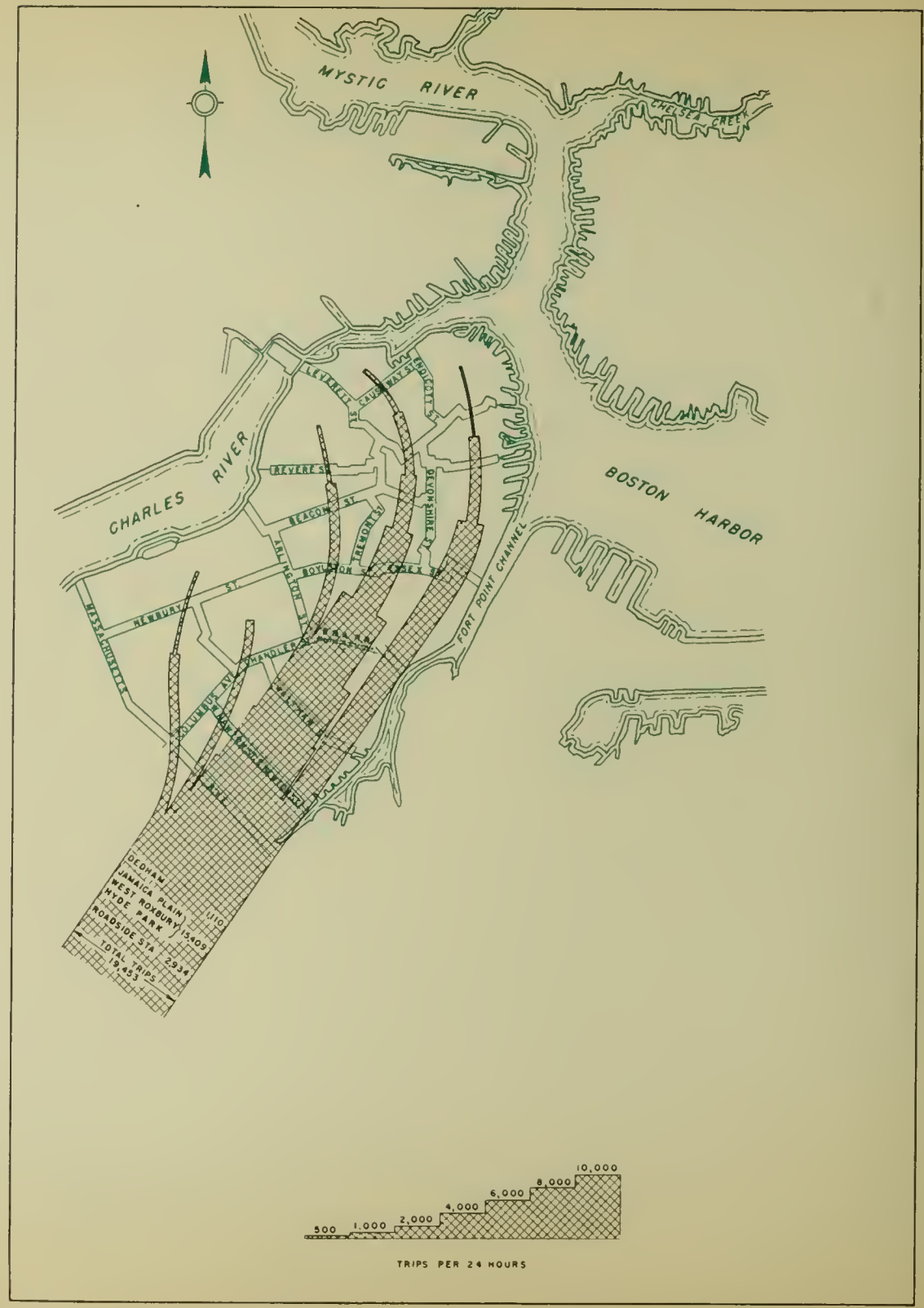
*All Types of Motor Vehicles*

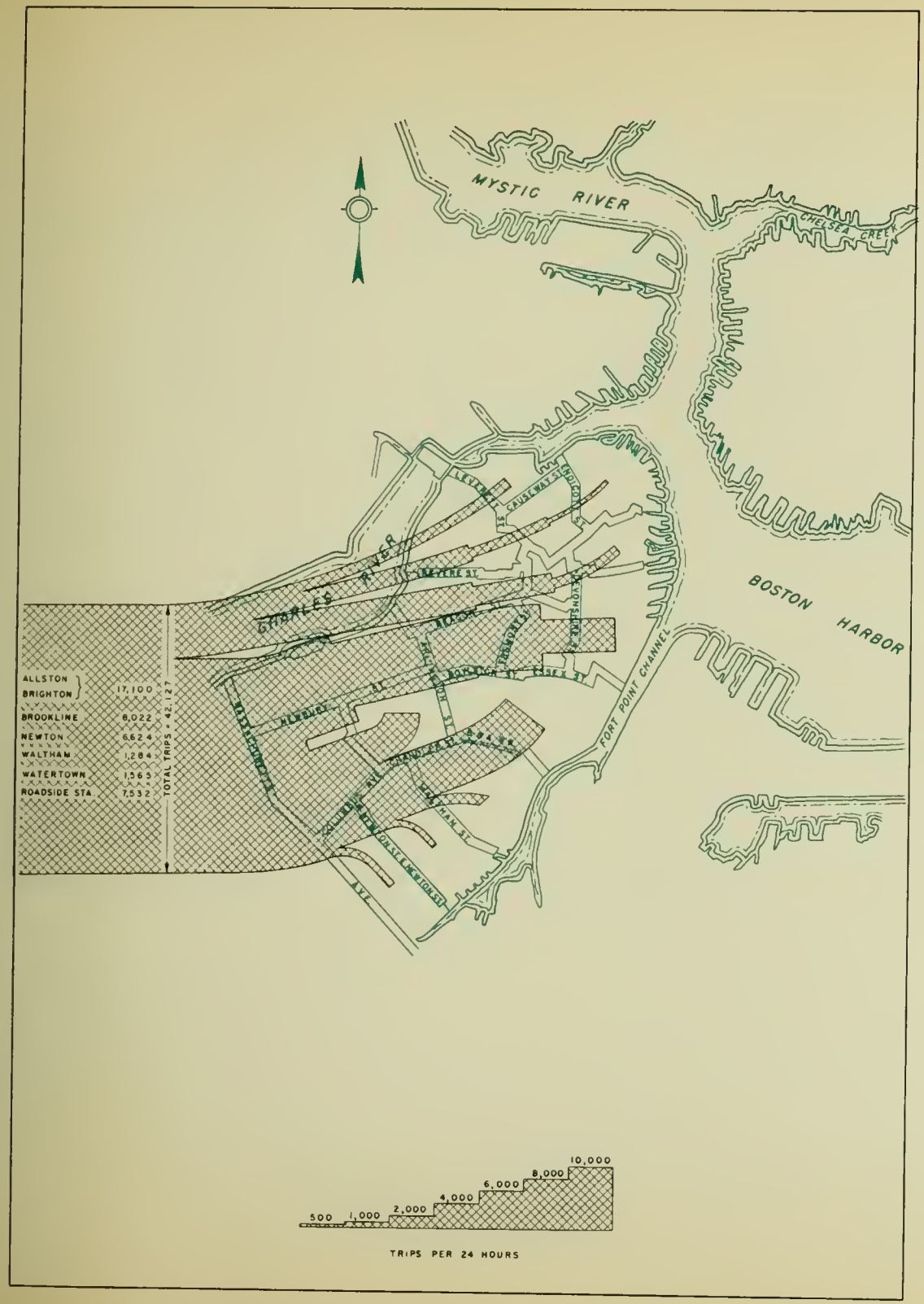
DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and Dedham, Jamaica Plain, West Roxbury, and Hyde Park plus the trips between the downtown area and the six roadside interview stations located at the boundary lines of these localities.

The greatest width of the band represents to scale 19,453 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

The locations of the six roadside interview stations and movement between these stations and the downtown area is as follows:

| Station Number | Location | Located at Boundary of | Trips | Percent |
|---|---|---|---|---|
| 29 | Great Plain Road | Needham | 235 | 8.01 |
| 30 | Route 135 | Needham | 17 | 0.58 |
| 31 | High Street, Route 109 | Dedham | 675 | 23.01 |
| 32 | Washington Street, Route 1A | Dedham | 639 | 21.78 |
| 33 | Providence Pike, Route 1 | Dedham | 1,293 | 44.07 |
| 34 | East Street | Dedham | 75 | 2.55 |
| | | Total | 2,934 | 100.00 |






# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 3

*All Types of Motor Vehicles*

DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and Allston, Brighton, Brookline, Newton, Waltham, and Watertown plus the trips between the downtown area and the eight roadside interview stations located at the boundary lines of these localities.

The greatest width of the band represents to scale 42,127 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

The locations of the eight roadside interview stations and movement between these stations and the downtown area is as follows:

| Station Number | Location | Located at Boundary of | Trips | Percent |
|---|---|---|---|---|
| 21 | Route 128 | Waltham | 68 | 0.90 |
| 22 | Route 117 | Waltham | 208 | 2.76 |
| 23 | Route 20 | Waltham | 587 | 7.80 |
| 24 | Route 30 | Newton | 400 | 5.31 |
| 25 | Washington Street | Newton | 516 | 6.85 |
| 26 | Route 9 | Newton | 4,792 | 63.62 |
| 27 | Central Avenue | Needham | 95 | 1.26 |
| 28 | Route 128 | Newton | 866 | 11.50 |
| | | Total | 7,532 | 100.00 |

# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 4

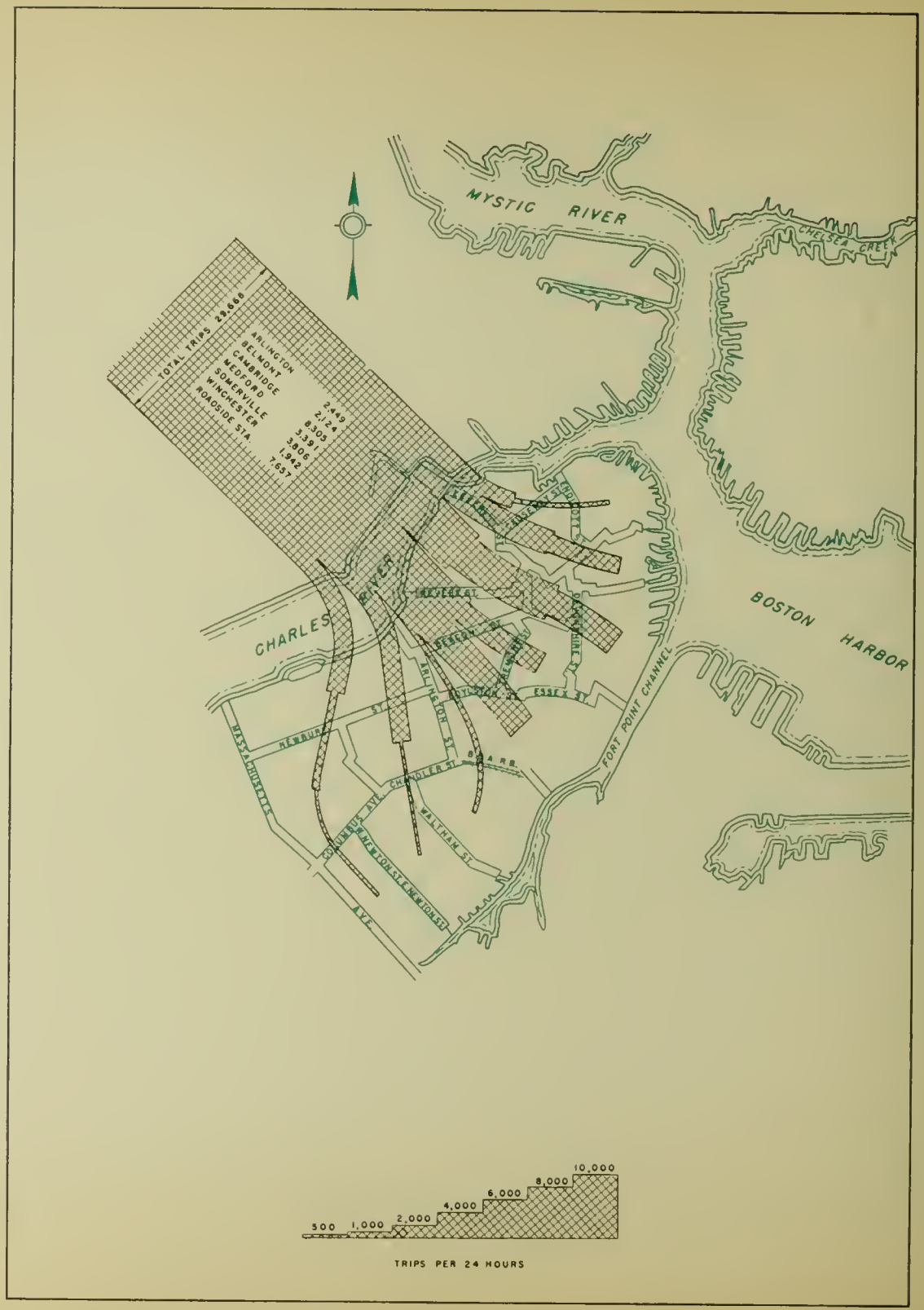
*All Types of Motor Vehicles*

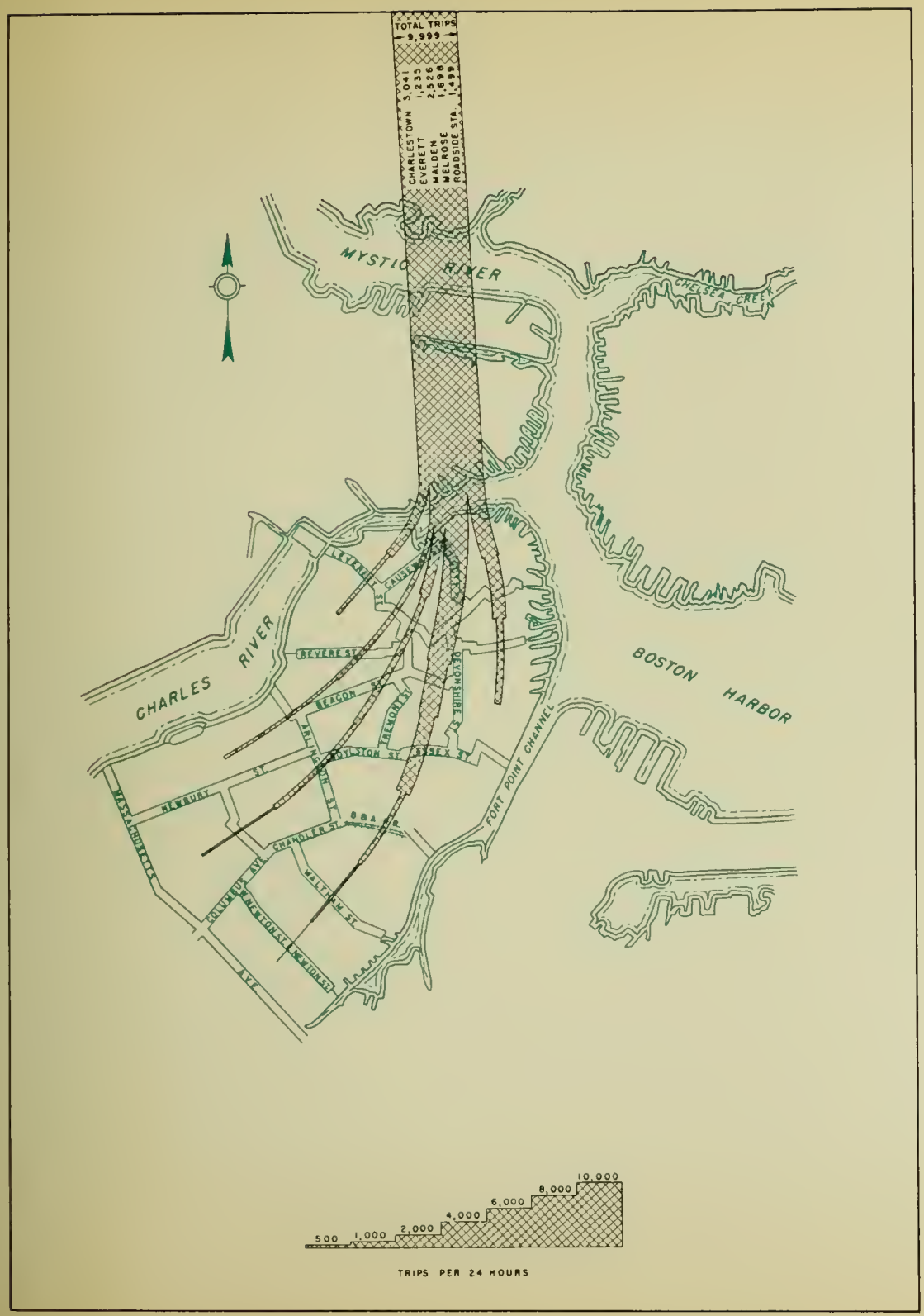
DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and Arlington, Belmont, Cambridge, Medford, Somerville, and Winchester plus the trips between the downtown area and the nine roadside interview stations located at the boundary lines of these localities.

The greatest width of the band represents to scale 29,668 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

The locations of the nine roadside interview stations and movement between these stations and the downtown area is as follows:

| Station Number | Location | Located at Boundary of | Trips | Percent |
|---|---|---|---|---|
| 12 | Woodland Road | Medford | 136 | 1.78 |
| 13 | Route 28 | Medford | 3,012 | 39.37 |
| 14 | Marble Street | Stoneham | 119 | 1.56 |
| 15 | Washington Street | Winchester | 105 | 1.37 |
| 16 | Main Street, Route 38 | Winchester | 701 | 9.16 |
| 17 | Cambridge Street, Route 3 | Winchester | 818 | 10.69 |
| 18 | Summer Street, Route 2A | Arlington | 108 | 1.41 |
| 19 | Massachusetts Avenue | Arlington | 336 | 4.39 |
| 20 | Concord Pike, Route 2 | Arlington | 2,316 | 30.27 |
| | | Total | 7,651 | 100.00 |






# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 5

*All Types of Motor Vehicles*

DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and Charlestown, Everett, Malden, and Melrose plus the trips between the downtown area and the three roadside interview stations located at the boundary lines of these localities.

The greatest width of the band represents to scale 9,999 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

The locations of the three roadside interview stations and movement between these stations and the downtown area is as follows:

| Station Number | Location | Located at Boundary of | Trips | Percent |
|---|---|---|---|---|
| 9 | Main Street | Melrose | 558 | 37.23 |
| 10 | Franklin Street | Melrose | 32 | 2.13 |
| 11 | Lynn Fells Parkway | Melrose | 909 | 60.64 |
| | | Total | 1,499 | 100.00 |

# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 6

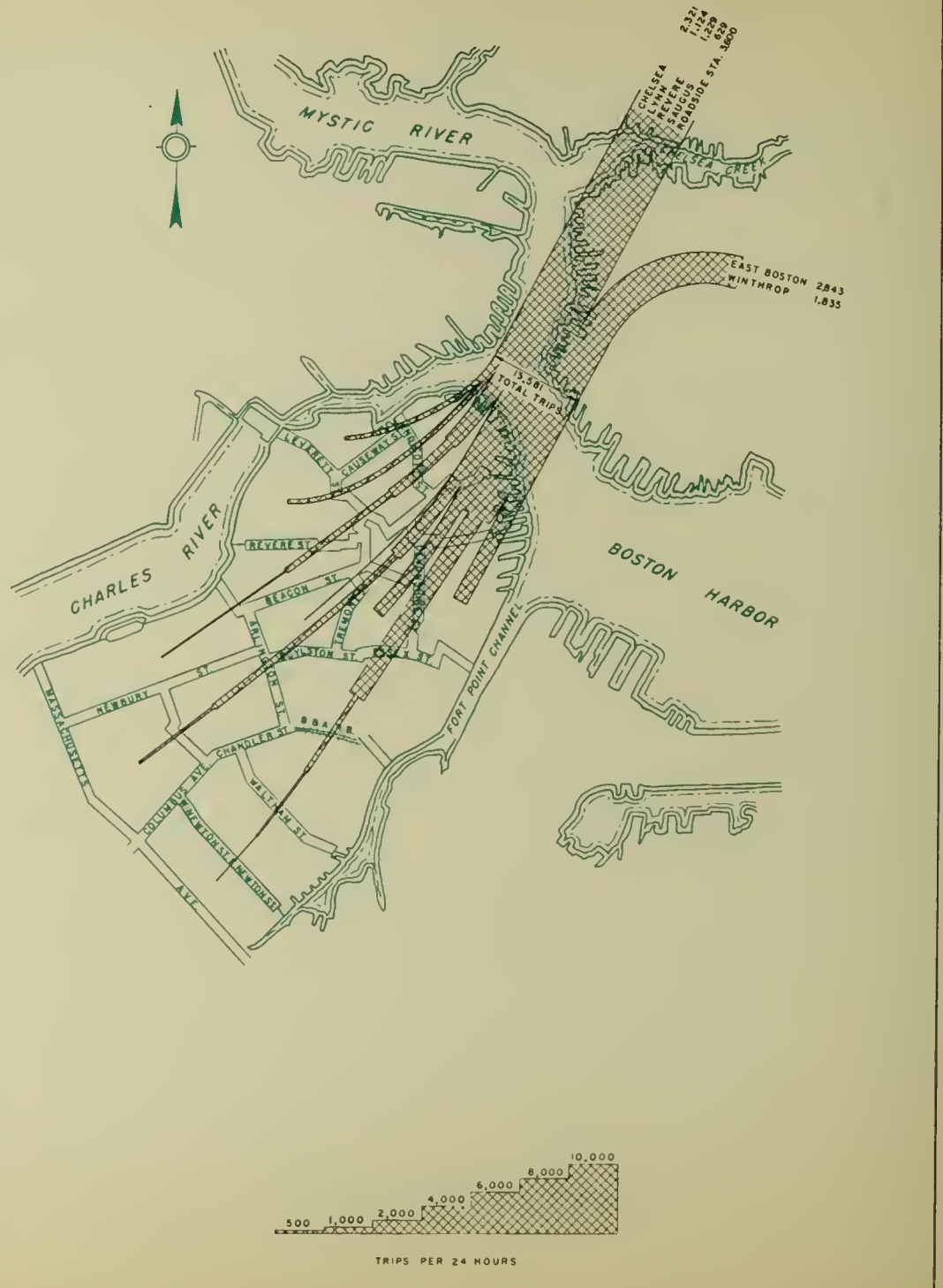
*All Types of Motor Vehicles*

DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and Chelsea, Lynn, Revere, Saugus, East Boston, and Winthrop plus the trips between the downtown area and the nine roadside interview stations located at the boundary lines of these localities.

The greatest width of the band represents to scale 13,581 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

The locations of the nine roadside interview stations and movement between these stations and the downtown area is as follows:

| Station Number | Location | Located at Boundary of | Trips | Percent |
|---|---|---|---|---|
| 1 | Route 129 | Lynn | 487 | 13.53 |
| 2 | Route 1A | Lynn | 581 | 16.14 |
| 3 | Essex Street | Lynn | 65 | 1.81 |
| 4 | Route 107 | Lynn | 461 | 12.81 |
| 5 | Lynn Street | Peabody | 138 | 3.83 |
| 6 | Lynnfield Street | Lynn | 17 | 0.47 |
| 7 | Route 1 | Saugus | 1,654 | 45.94 |
| 8 | Water Street, Route 129 | Saugus | 48 | 1.33 |
| 47 | Nahant Road | Nahant | 149 | 4.14 |
| | | Total | 3,600 | 100.00 |



# TRIPS BETWEEN DOWNTOWN BOSTON AND AREA 7

*All Types of Motor Vehicles*

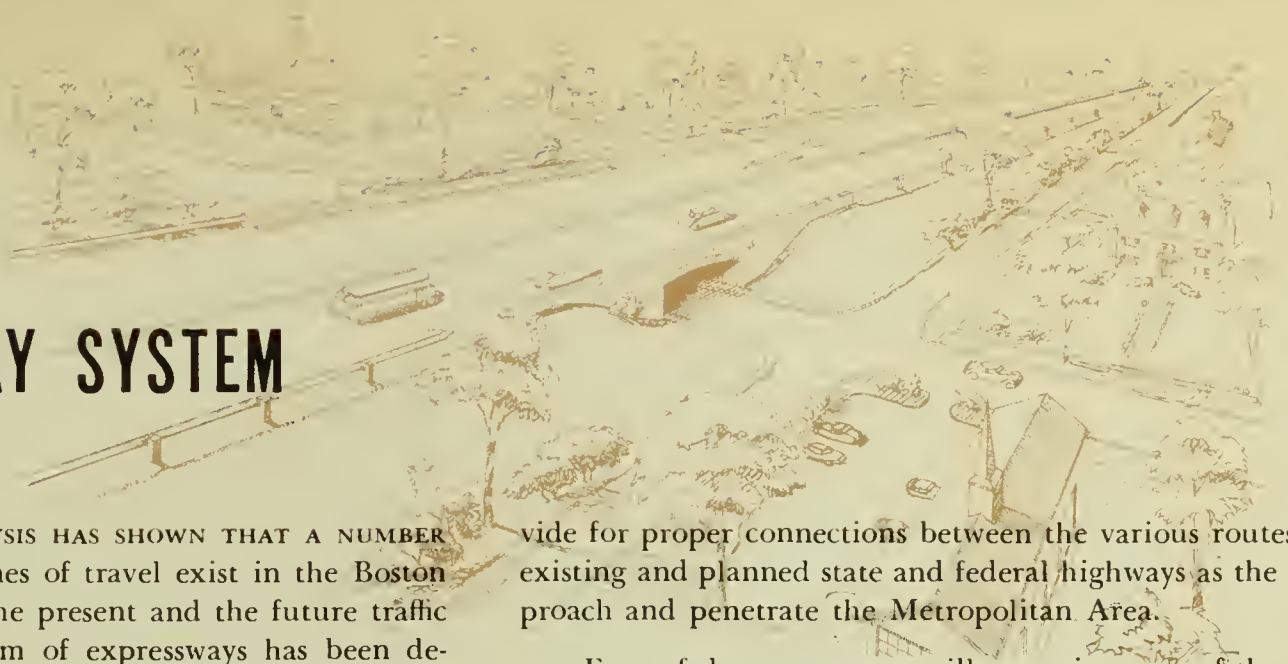
DISPERSION of the total daily movement of all types of motor vehicles between zones of the downtown area and South Boston. There were no roadside interview stations located in South Boston.

The greatest width of the band represents to scale 8,095 total daily trips. The smaller scaled tentacles indicate the dispersion of these daily trips to the zones of the downtown area.

# TRIPS WITH ORIGINS OR DESTINATIONS IN EACH SECTOR OF DOWNTOWN BOSTON

*All Types of Motor Vehicles*

NUMBER of daily trips by all types of motor vehicles that have origin or destination in each sector of the downtown area. The total trips shown are 191,591 and include movement from zones to the downtown area, roadside stations to the downtown area and the intra-downtown area movement.



# THE EXPRESSWAY SYSTEM

THE TRAFFIC ANALYSIS HAS SHOWN THAT A NUMBER of well defined major desire lines of travel exist in the Boston Metropolitan Area. To serve the present and the future traffic along these travel lines a system of expressways has been developed to form the backbone of the highway transportation network. The data collected from the origin and destination survey have been used in the analysis of the proposed system of expressways to determine the location of the facilities which will meet the needs of the greatest number of motorists within and passing through the study areas. In selecting routes for analysis to determine the amount of traffic and the service which would be rendered, eight radial routes closely conforming to the major directional lines of travel have been chosen, as shown on Page 50. Deviations from these direct lines of travel have been imposed in several instances, however, by such practical considerations as bays, hills, or highly developed communities.

## GENERAL CONSIDERATIONS

In developing the system it was necessary to make a thorough study of existing highways in order to analyze these facilities as feeders or supplemental routes, thus minimizing the number of expressways ultimately required to serve indicated traffic volumes. In this connection the expressways have generally been located where they will not parallel or compete with existing adequate highways. The system has been so located as to provide for proper connections between the various routes and the existing and planned state and federal highways as the latter approach and penetrate the Metropolitan Area.

Four of the expressways will comprise parts of the proposed forty thousand mile network of interstate highways to serve the entire United States. This system was originally proposed by the National Interregional Highway Committee and reported to the President of the United States in January 1944. It was approved by the several state highway departments and the Administrator of the Public Roads Administration, Federal Works Agency, on August 2, 1947. The recommended system is designed to fulfill the needs of interstate and intercity highway transportation necessary to the future economic welfare and defense of the nation. Under such a program the Boston area would be served by U. S. Route 1 to the south via Providence, U. S. Route 20 to the west, thru Springfield, U. S. Route 3 thru Lowell to the northwest, and by U. S. 1 to the north thru Newburyport. The present locations of these four routes are shown on Plate 1. They must be improved and, in most cases, relocated before they will conform with interstate standards of design for capacity, sight distances, grades and, primarily, limitation of access.

Since these highways have generally been found to be inadequate to carry heavy volumes of traffic, it is important that urban sections of the interstate system be developed first. There-

fore, Federal funds have been appropriated to aid in the construction of such urban portions of these routes. To qualify for these funds such highways must be designed and built to high standards as limited access highways or expressways.

In general the expressways will require rights-of-way from two hundred to three hundred feet wide. Locations have been selected, therefore where such takings of real estate will not entail prohibitive cost. Long sections of sparsely developed property have been found for this purpose. Where populated areas must be traversed, the routes have generally been located in neighborhoods where real estate values are now low and where they are still declining. The new service provided by the expressways should arrest the deterioration of such neighborhoods and aid in their rehabilitation. Further studies were made of new residential and industrial developments and population trends within the areas traversed to determine the effect of these items upon the traffic potentialities and utility of each route. In laying out the system of expressways, special consideration has been given to the need for constructing each route in stages over a period of years. Under such a program each unit as constructed should serve as a needed and efficient traffic artery while the balance of the system is being completed.

A further consideration in locating the master expressway system involved a study of other forms of transportation and plans for their improvement and extensions, in order to provide one integrated transportation system rather than competing or parallel systems.

The locations shown for the various expressways on the large folded map in the back of this report and on the plan and profile sheets appended hereto are the result of preliminary surveys only. Final studies of the individual routes required for design purposes may lead to deviations in alignments as great as several hundred feet from those shown herein. It is certain, however, that alignments in the general locations indicated can be found for expressways conforming with all of the basic design standards.

## DESIGN STANDARDS

Basic standards utilized in the location and design of the expressway system are in conformity with those proposed and adopted by Federal and State Governments for use on the interstate highway system. While conformance with these standards is recommended by the interregional committee as a condition precedent to cooperation on the part of the Federal Government in the construction of any route forming a link in the system, nevertheless the committee has recognized that in certain instances, topography, property values, or other controlling features may prevent absolute adherence to the standards recommended. These standards, as applicable to both rural and urban expressway design, have been found to be necessary in their application because of the large volumes of high speed mixed traffic using these highways. Many of these design features are also necessary in order to reduce the high accident rates now prevalent on most of the main arterial highways in the Boston Metropolitan Area.

As previously explained, all sections of the expressway system have been selected on the basis of the limited access principle. Application of these basic standards and principles must be considered in classifying and designing expressways to accommodate safely the traffic volumes which they must be expected to handle over a period of at least 20 years as determined by the traffic analysis. A study of these volumes has indicated the number of traffic lanes required in the ultimate design.

Because almost the entire Metropolitan Area is rapidly developing urban characteristics, it is recommended that all expressways included herein be designed to urban standards. The established criterion requires that where traffic volumes are less than 20,000 vehicles daily, two lanes each 12 feet in width are

required in each direction, separated by a suitable median divider. Where volumes are in excess of 20,000 vehicles daily three traffic lanes in each direction are required.

In applying the limited access feature wherein right of access is confined to designated points or interchanges, a wide right-of-way is highly desirable. A width of three hundred feet should be maintained wherever feasible in order to provide ample room for pavement, shoulders, side slopes, service roads, landscaped areas, and interchange ramps. A typical cross section illustrating these features is shown herewith. The section contains six 12 foot traffic lanes separated by a median strip of varying width. Four-lane sections are of similar design. Flanking the pavements will be two 12-foot shoulders designed to accommodate heavy disabled vehicles. Surface drainage will be cared for in general by a storm water system, collecting water from curb inlets. To accommodate the heavy volume of mixed traffic, the designs incorporate pavements of adequate strength on a specially prepared 12″ sub-base. In most sections special consideration has been given to sub-surface drainage for the entire graded section, as well as for the pavement base.

The accepted standards for horizontal and vertical curvatures and sight distances must be adhered to in order to provide a highway which will safely carry the volumes of traffic expected at a design speed of fifty miles per hour. The use of spiral transitions on horizontal curves is mandatory.

Profiles are more or less fixed by the elevations of existing highways and railroads crossed by the expressways. However, where possible the fifty-fifty principle should be applied wherein the expressway grade is raised or lowered half the vertical separation distance, and the intersecting highway the remaining distance. In this manner deep cuts and high fills are minimized on the expressways proper. A maximum 3 percent grade has been established as one of the governing conditions in this study. Both vertical and horizontal clearances at all railroad and highway separation structures should conform to the minimum requirements for interstate highways. The use of collision walls at all piers and abutments is recommended. Special architectural treatment of these structures should be provided and where exposed concrete is present the surface should be protected with a stone facing. A typical overpass and underpass structure together with service roads is illustrated herein.

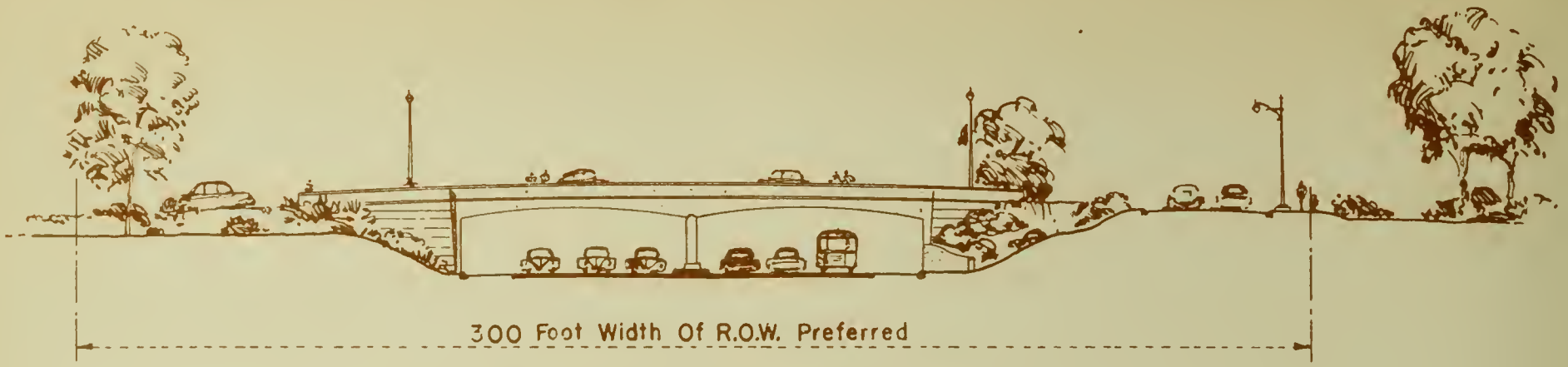
In many urban districts physical restrictions are such as to require the use of depressed sections, confined between retaining walls. A typical section showing this type of construction is illustrated herewith.

On certain sections including the Central Artery portion of the expressway belt explained hereinafter an elevated highway design must be utilized. A typical section of elevated highway together with access ramps is shown on an accompanying drawing.

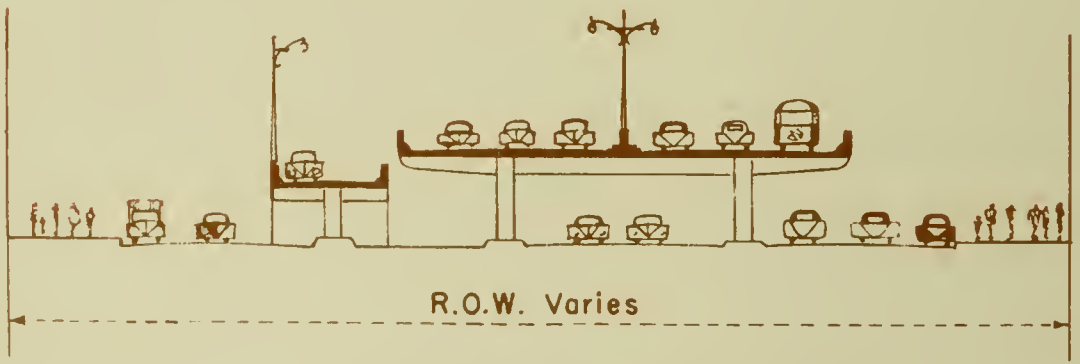
Ramp connections must be provided for egress and ingress at important intersecting highways. These ramps will connect to the expressway by means of long acceleration and deceleration transition lanes. The connection of ramps to existing streets must be channelized to provide safe turning movements at these points. At points where expressways intersect, directional interchanges will be provided, designed for normal expressway speed and capacity.

A typical "Y" interchange between three expressways is shown on the delineation. Where four expressways intersect, a directional or "braided" type must be provided as shown on another accompanying delineation.

Because of the high speeds and large volumes of traffic on such expressways, auxiliary safety features must be furnished such as right-of-way fencing, guard rail, integral pavement markers, warning and directional signs, and roadway lighting. Large warning and directional signs must be placed well in advance of the designated points because of the high speeds attained.

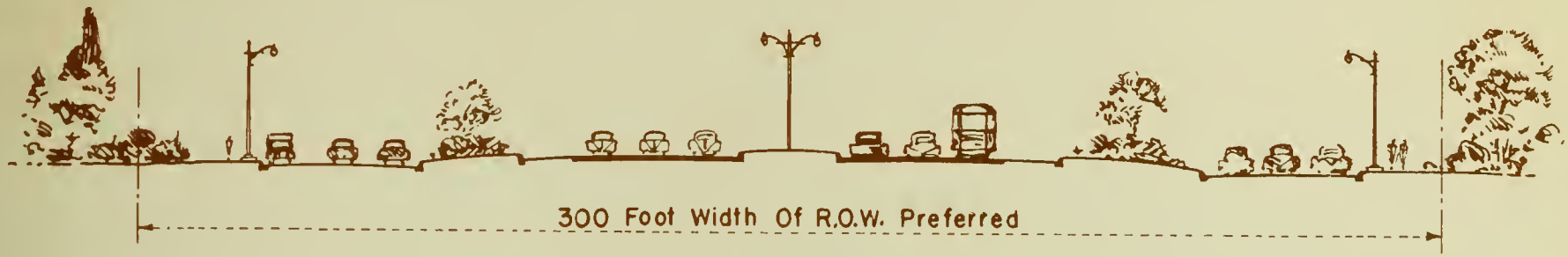



URBAN SECTION UNDERPASS
WITH MINIMUM MEDIAL DIVIDER
AND SERVICE ROAD
FOUR LANE SECTION SIMILAR

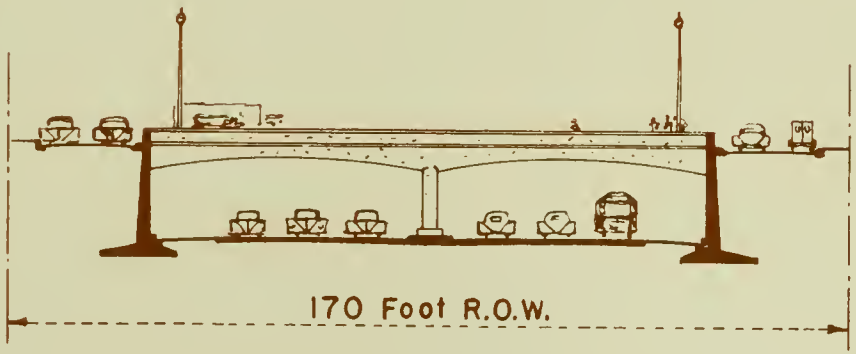



ELEVATED SECTION

TYPICAL EXPRESSWAY CROSS-SECTIONS

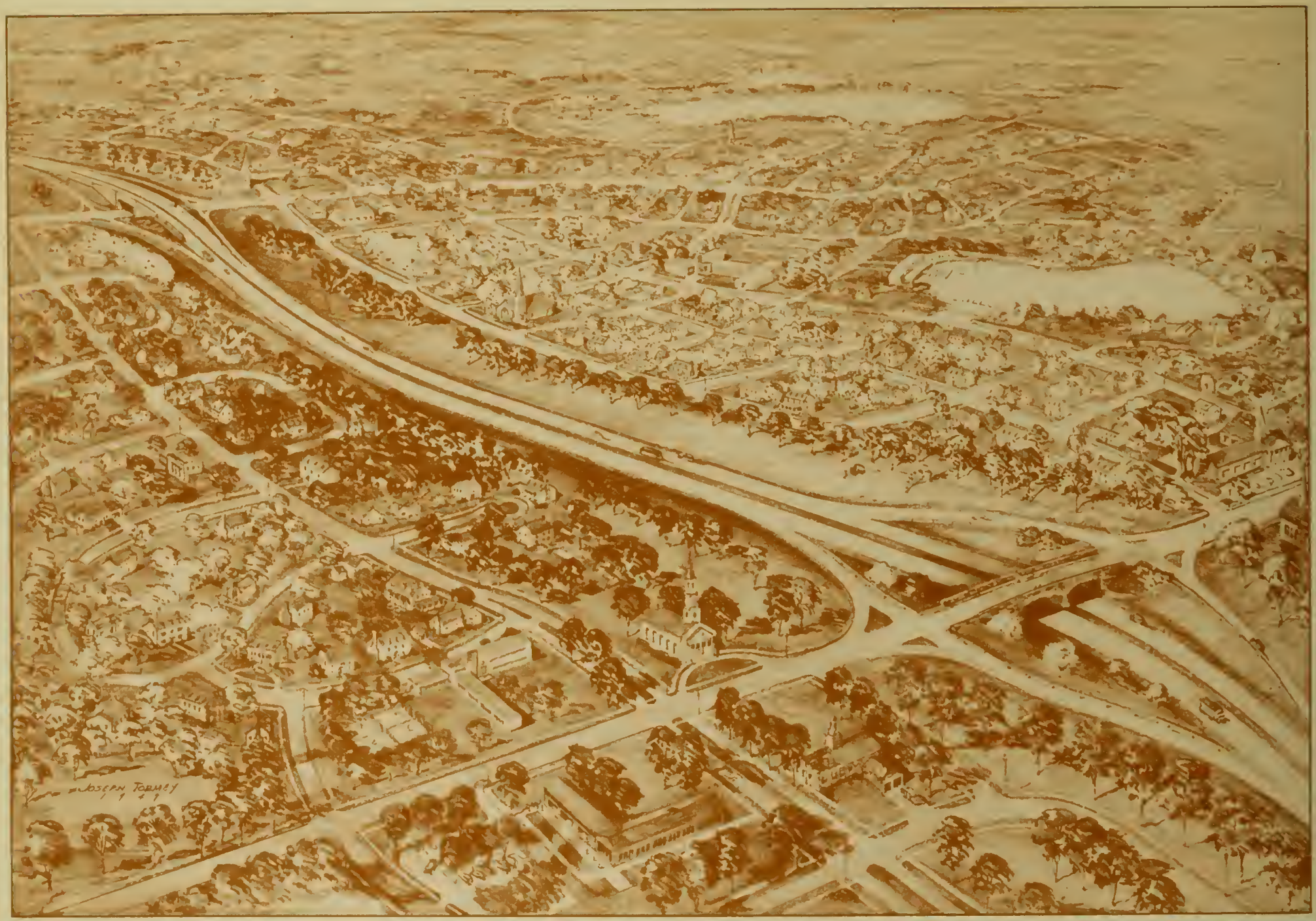



URBAN SECTION
WITH SERVICE STREETS
FOUR LANE SECTION SIMILAR

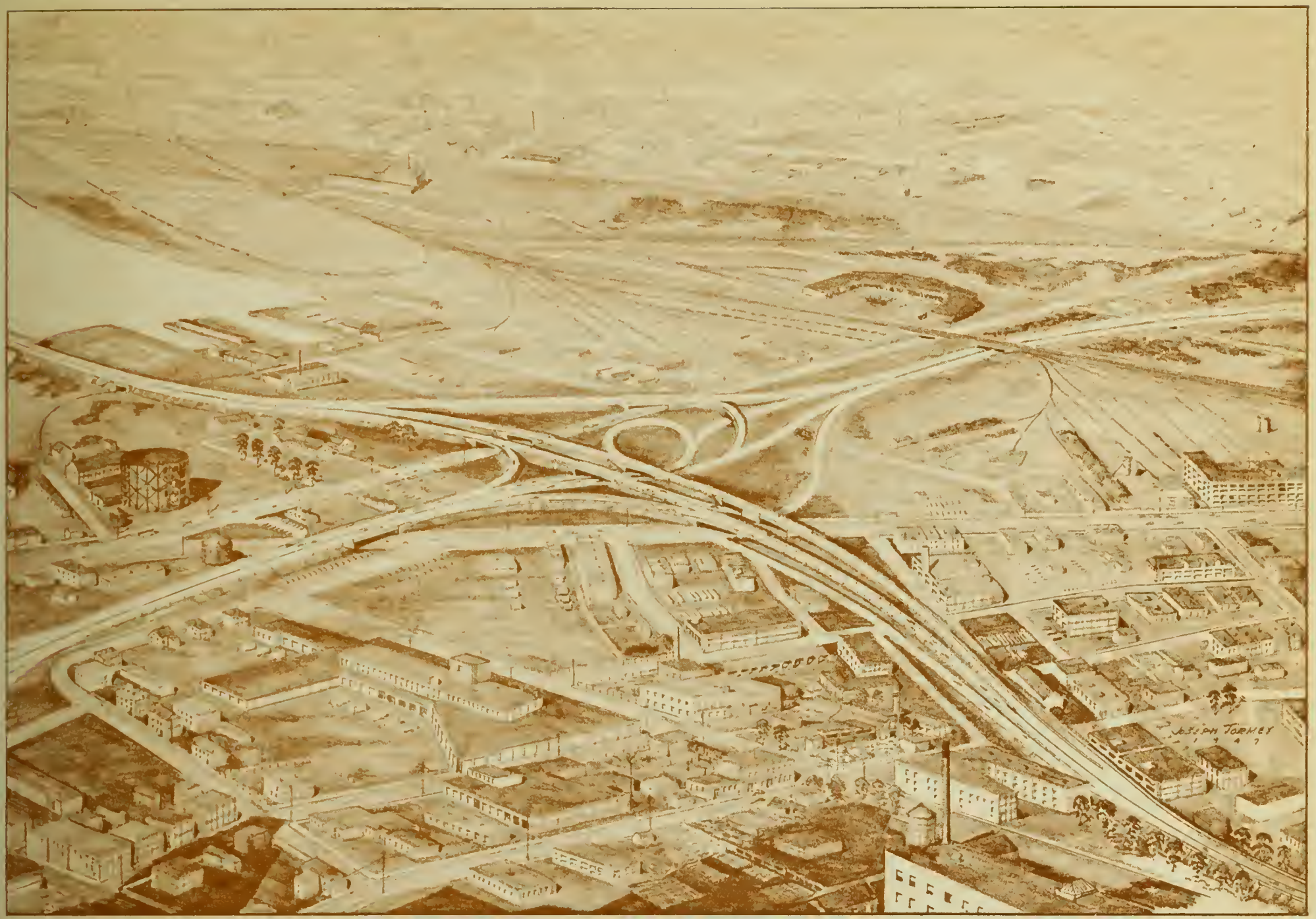



DEPRESSED SECTION

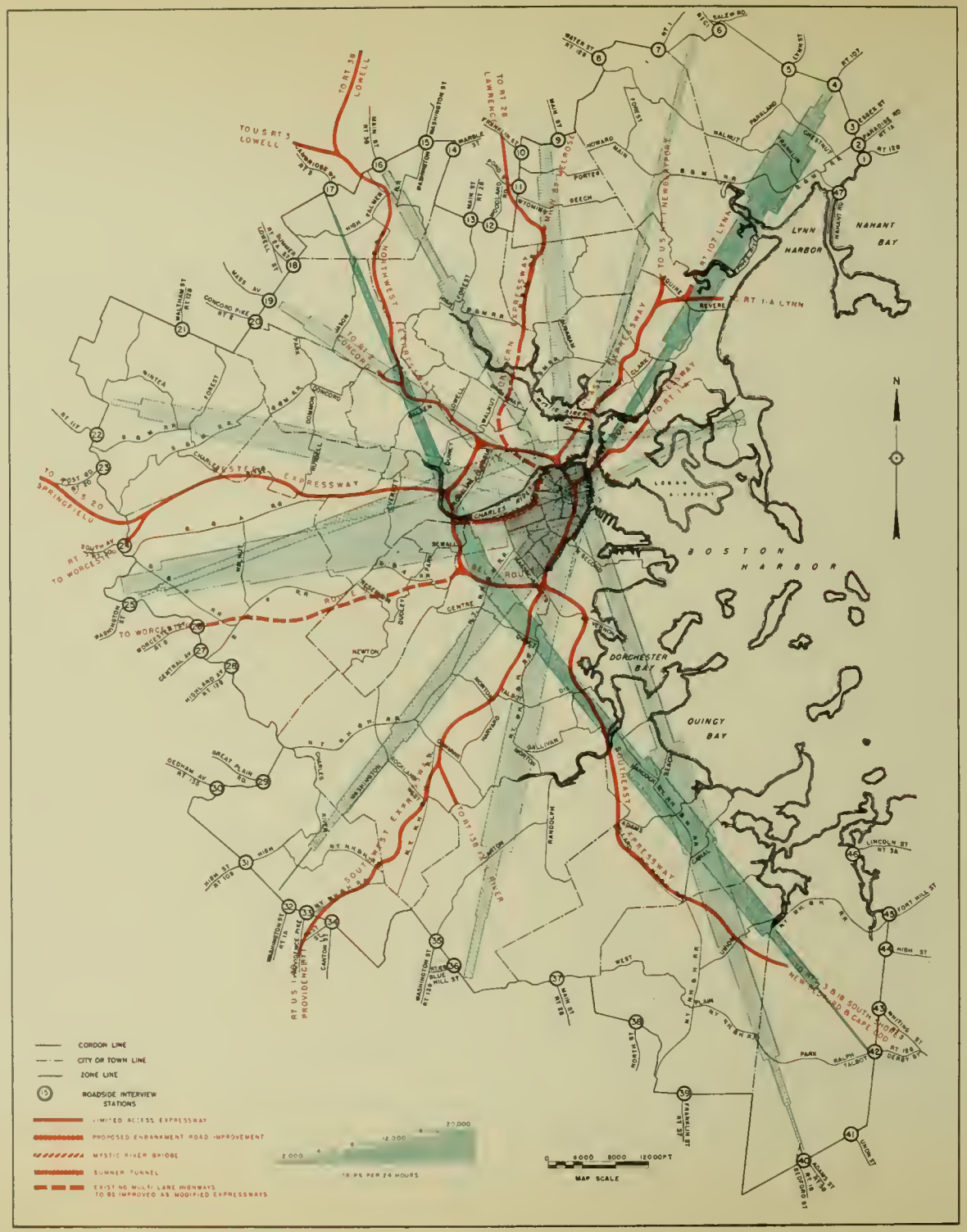
TYPICAL EXPRESSWAY CROSS-SECTIONS



TYPICAL EXPRESSWAY OVER-PASS AND UNDER-PASS



MASSACHUSETTS AVENUE INTERCHANGE




EXPRESSWAY SYSTEM WITH RELATION
TO MAJOR DESIRE LINES OF TRAVEL

On certain long sections of the expressway system it may be desirable ultimately to install such conveniences as gasoline stations and rest rooms.

Landscaping of side slopes, medial dividers, and marginal strips will give the expressways a park-like appearance and absorb the hum of highway traffic. Adjacent property will be desirable for new buildings of all kinds, residential, industrial and institutional, because of the superior transportation facilities afforded and the attractive view provided. Special landscape treatment is recommended for the large areas at interchanges and access points to prevent erosion at these locations as well as for the aesthetic value.

## SELECTION AND DESCRIPTION OF ROUTES

Based upon the above requirements and criteria, a complete system of multi-lane, limited access expressways has been developed. The expressways are shown herewith in relation to the major desire lines of travel. A folded map in this report shows the entire expressway system.

There are 8 radial expressways included in the master plan, all of which will connect to a central belt route. Exhibits are appended which show plans and profiles for each of these routes. For purposes of easy reference these plans are designated and shown on the key map of the area, illusrated on Exhibit 1.

The flow map on Page 66 shows traffic volumes equivalent to those which would use the various routes at the traffic levels existing at the time of the origin and destination survey and also those at 1970 levels, which include allowances for increases due to induced traffic, population increases, growth in automobile ownership, and other factors. Traffic volumes on each section of the various routes together with the location and traffic movement at interchanges and the number of lanes required to serve this traffic, are shown on Page 67. The method of deriving the traffic expansion figures is described more fully in the section on Estimates of Future Traffic.

The type of design, location, and alignment of the various sections of the proposed expressways can best be understood by inspection of Exhibits 1 to 25 inclusive appended hereto. The need for the various bridges, underpasses, interchanges and other structures will be observed from a study of these plan and profile maps. Lengths of the various sections are shown under Estimate of Costs. Profile elevations refer to Mean Sea Level Datum, United States Coast and Geodetic Survey. For purposes of identification the various expressways have been designated on these and other plates as "Southeast", "Southwest", et cetera. Each route will now be described in rotation starting at Quincy Bay and proceeding clockwise.

## SOUTHEAST EXPRESSWAY

One of the most densely populated sections within the Metropolitan Area borders the bays and harbors from Boston to Quincy and the southeast. Two very heavy desire lines of travel are indicated within this area, one of which passes over Dorchester Bay and Old Harbor, and the other extends further to the west through Brookline. In order for one expressway to properly serve both of these lines it is apparent that a desirable location should lie generally along the waterfront.

Traffic through this area is presently served by the Old Colony Parkway, a four-lane facility restricted to pleasure vehicles, and by Dorchester and Neponset Avenues both narrow inadequate arteries, serving truck traffic. Improvements or expansion of these latter facilities has been difficult because of the thickly populated areas through which they pass. Congestion exists which is further aggravated by a special traffic condition which is not reflected by the results of the origin and destination survey which determined travel habits for a typical week day only. The large resort areas lying to the east and south of Quincy

generate heavy peak volumes of weekend traffic which now must pass through or around this city. The traffic volumes indicated, therefore, do not give a true picture of this special condition. Volume counts, however, at strategic locations to the west of Quincy indicate that these peak-hour loads are of sufficient size and number to warrant the construction of a combination by-pass route south of this city to accommodate this resort traffic and at the same time intercept several of the main traffic arteries leading to the heart of the city.

In selecting a route for the Southeast Expressway the utilization of the Old Colony Parkway for part of the distance has been considered and on the basis of stage construction it is recommended that those sections of this artery so designated should be adjusted to accommodate all classes of vehicles until such time as the completion of the entire expressway can be accomplished.

A number of possible locations were analyzed for this expressway, the first being directly through the city of Quincy. It was found that due to the heavy concentration of built up areas such a location was not desirable from a cost and right-of-way standpoint and would not serve the by-passable traffic as well as other possible routes. Several locations were considered through the Dorchester section of Boston but were abandoned for the easterly location because of high right-of-way costs and the fact that most of this section will be served by the Southwest Expressway.

The Southeast Expressway is shown on Exhibits 2, 3 and 4. The northern end of the expressway connects with the central Belt Route via an interchange in the vicinity of Massachusetts Avenue and Southampton Street. From that point it proceeds in a southeasterly direction to a connection with the Old Colony Parkway just south of Columbia Circle. From that point it more or less parallels the New York, New Haven & Hartford Railroad to intersect with the Old Colony Parkway, Gallivan Boulevard and Hancock Street near the Neponset River. At that point a complete interchange provides for access to these highways and other local streets. The main flow of traffic from Quincy would gain access to this section of the expressway, via Hancock Street thru this interchange.

The by-pass section of the Southeast Expressway begins at this interchange, crosses the Neponset River and passes through East Milton, West Quincy, Braintree and Weymouth to connect with the junction of state Routes 3 and 18 and future state Route 128.

Intermediate interchanges are located at the following intersecting highways, providing access to the various communities through which this expressway passes:

| | |
|---|---|
| Columbia Road | Dorchester |
| Freeport Street | Dorchester |
| Adams Street | East Milton |
| Cross Street | West Quincy |
| Furnace Brook Parkway | West Quincy |
| Center Street | Quincy |
| Independence Avenue | Braintree |
| Union Street | Braintree |

As shown on the exhibits, parallel service roads are provided for access to abutting property and to intersecting highways cut off by the new expressway.

A movable bridge is required at the Neponset River crossing to provide for the small volume of navigation using this stream. From this river to the Belt Route the expressway is carried on embankments of varying height to keep the grade line well above the frequent high tides.

## SOUTHWEST EXPRESSWAY

Two very heavy desire lines of travel begin at the business district of Boston and extend to the southwest thru the Roxbury, Dorchester and Hyde Park sections of Boston and thru the towns of Milton and Dedham. U. S. Route 1 from Providence, state

Route 138 from Taunton and Fall River and Route 28 from Brockton and New Bedford contribute considerable traffic to this area. Traffic volumes appear to be insufficient to require the development of two expressways and therefore the selection of a route was based upon finding a location which would lie generally between these two desire lines, serve the entire southwest area and not parallel existing usable arteries.

Washington Street and Blue Hill Avenue serve the majority of truck traffic through this area while a large portion of the pleasure car traffic uses the Veterans of Foreign Wars Parkway, U. S. Route 1. It was felt that a new location should be developed between these highways to which existing thoroughfares could be connected to attract traffic to the new route. Because of the heavy concentration of population within the entire area traversed, selection of a suitable route was difficult. However, by studying a number of locations one was found where, by utilizing existing highways and vacant areas and, by traversing sections where property values were the lowest, it was possible to find a route which could be developed at a reasonable cost.

The location selected as shown on Exhibits 5 to 8 inclusive begins at the belt interchange with the Southeast Expressway in the vicinity of Massachusetts Avenue and Southampton Street. The alignment is east of and parallel with Blue Hill Avenue to its intersection with Seaver Street. At that point the expressway passes under Blue Hill Avenue and follows the eastern edge of Franklin Park to the American Legion Highway. This dual highway is utilized for the expressway as far as Cummins Highway. The southern half of this artery is utilized as a service road and the northern half as one half of the expressway.

From Cummins Highway the route follows Stony Brook, crosses the main line of the New York, New Haven and Hartford railroad, paralleling this railroad to West Street in Hyde Park. From this point it parallels the east side of Stony Brook Reservation to a crossing of River Street. The route then generally follows undeveloped territory to cross over Milton Street, an important feeder highway, and the Dedham branch of the New York, New Haven and Hartford railroad, to its southern terminus connecting with U. S. Route 1 two and one half miles south of Dedham.

The route selected contains a number of curves, found necessary because of physical and other obstructions. However, the general alignment of the entire route varies only slightly from a straight line.

Intermediate interchanges are located at the following intersecting highways, providing access to the surface street system:

| | |
|---|---|
| Massachusetts Avenue | Roxbury |
| Seaver Street and Blue Hill Avenue | Dorchester |
| Morton Street | Dorchester |
| Cummins Highway | Roslindale |
| Gordon Avenue | Hyde Park |
| Milton Street (Route 135) | Dedham |
| East Street | Dedham |

In order to relieve existing traffic congestion on Blue Hill Avenue and to connect with important traffic arteries to the south via state Route 138, an expressway connection is provided from a point near the Cummins Highway paralleling Huntington Avenue to connect through a two-way interchange with the existing six-lane Neponset River Parkway at the Milton-Boston line. By connecting the Neponset Parkway with Blue Hill Avenue, an excellent facility is thus provided to the south.

The selected route should relieve the traffic congestion on Washington Street by diverting truck traffic from this artery destined for the center of the city and at the same time relieve traffic on Blue Hill Avenue. A large number of lateral feeders are available for draining traffic from the areas contiguous to this expressway. Several of these are included in the program for improvement of the existing street system.

## WORCESTER TURNPIKE, STATE ROUTE 9

On the map of the Metropolitan Area folded in the back

of this report, the Worcester Turnpike is indicated by a pink line. This highway is the first radial route approaching the city north of the Southwest Expressway which is capable of handling large volumes of mixed traffic efficiently. Considerable thought was given to improvement of this highway to expressway standards, but because of steep grades and right of way restrictions, this idea was discarded. Comparative cost estimates indicated that a more logical solution would be to provide an additional parallel facility further to the north to be designated as the interstate route to the west rather than to rebuild Route 9 as a limited access facility.

In order for this artery to continue to serve its portion of the metropolitan area efficiently, it will be necessary to immediately improve a short section near the Belt Route on a basis similar to that proposed by the Town of Brookline. Such a plan would entail the building of a 6-lane limited access facility from a point where Brookline Avenue intersects the Belt Route to a point just west of Warren Street and Sumner Road as shown on Exhibit 9.

The remainder of this route to the west will continue to serve as a normal divided highway. However, it should be widened at an early date to six full lanes with shoulders, as far as the Hammond Pond Parkway. The medial divider would be closed to prevent left turn movements. The construction of grade separation structures at Chestnut Hill Avenue and Hammond Street is recommended as well as provision for a service road on the north side as far as Chestnut Hill Avenue.

According to the traffic analysis, this improved route will be entirely adequate to serve traffic until the Western Expressway is completed and in use.

No detailed plans are presented for this latter portion of Route 9. However, the estimate of cost for this expressway includes an item for these changes. Grade separation structures are now provided at the following street intersections:

| | |
|---|---|
| Hammond Pond Parkway . . . . . | Newton |
| Parker Street . . . . . | Newton |
| Needham Street (Route 128) . . . . | Newton |

## WESTERN EXPRESSWAY

The heaviest desire line of travel in the Metropolitan Area is in the western section. This area includes Brookline, Brighton, Watertown, Newton and Waltham. Traffic in this area is presently served by the Worcester Turnpike, Beacon Street, Commonwealth Avenue, Washington Street, North Beacon Street in Brighton, Arsenal Street and Western Avenue. While several of these arteries are multi-lane facilities, they cannot be improved to expressway standards except at tremendous cost for rights-of-way. As previously explained, an alternate solution was adopted involving the construction of a new expressway thru this area to supplement state Route 9 and to connect with U. S. Route 20 and state Route 30. It is recommended that this expressway be considered as the new limited access interstate highway via Worcester to the west. In this manner two parallel expressways should efficiently serve the heavy desire of travel from east to west.

The selected route utilizes, for a great portion of its length, undeveloped areas along the Charles River, as shown on Exhibits 10 and 11. Beginning at the Belt Route near the River Street Bridge in Cambridge, a new structure will carry this artery over the Charles River, and then after paralleling Western Avenue and Soldier's Field Road it recrosses the Charles River. Thence continuing along this river it crosses Arsenal Street to connect with North Beacon Street. The alignment then parallels the Boston and Albany Railroad as far as Watertown. From Watertown the highway follows the southern bank of the Charles River to Bridge Street in Newton. At this point the highway crosses to the northern bank of the Charles River for a short distance and then returns to the southern side. It then continues in a southwesterly direction through the northern sec-

tion of Newton, crossing River and Lexington Streets and terminates at Commonwealth Avenue, Route 30, in the vicinity of Norumbega Park. A suitable location is provided near this western terminus for the future construction of an interchange with a recommended extension of this expressway to connect with either existing U. S. Route 20 or Route 9, whichever may be designated as the interstate highway to the west.

Interchanges along this route are located at the following points:

| | |
|---|---|
| River Street | Cambridge |
| North Harvard Street | Boston |
| Arsenal Street | Watertown |
| North Beacon Street | Boston |
| Galen Street | Watertown |
| Route 128 — Waltham Street | Newton |
| River Street and Rumford Avenue | Newton |
| Route 30 — Commonwealth Avenue | Newton |

While construction costs due to the number of bridges on this location are somewhat higher than on alternate alignments, large savings in right-of-way costs are effected by passing through undeveloped areas along the river bank. In this connection it should be noted that existing park drives border both banks of this river and in all cases where one bank is used for the expressway, an existing park drive remains on the opposite side.

By connecting to the Belt Route as shown, movements to all parts of the Metropolitan Area from the western section can be facilitated.

The utility of an expressway in this location is apparent when it is considered that population statistics indicate increased expansion for all sections of the Metropolitan Area to the west which would be served by this new artery.

## NORTHWEST EXPRESSWAY

The travel desire lines as shown on Plate 11 indicate a very heavy travel trend to the northwest through Somerville and Arlington to the Concord Turnpike, and to the north via Medford, Winchester and Woburn. This section of the Metropolitan Area is very heavily populated, and at the present time is not adequately served by any highways connecting directly with downtown Boston. Present traffic from the northwest follows the Alewife Brook Parkway and Boulevards bordering the Charles River, in order to gain access to the business section via congested routes such as Commonwealth, Beacon and others. This condition further congests these surface streets already crowded with traffic from the western section of the area. It is therefore mandatory to provide a direct expressway connection between downtown Boston and the cities and towns to the northwest in order to remedy this situation. In developing this expressway, many alternate studies were made to find the best location which would coincide with the desire lines of travel and, at the same time, serve traffic approaching the Metropolitan Area from the north and northwest via the Concord Turnpike, U. S. Route 3 and Route 38. The route as proposed and shown on the Exhibits 12 to 15 inclusive, accomplishes this purpose in the most economical manner while at the same time serving the various urban areas through which it passes.

Special consideration was given to a connection with a future location for U. S. Route 3 the interstate highway via Lowell to the northwest. It was first planned to bring this highway in via the Concord Turnpike instead of via Winchester as shown. Studies indicated however that it would not be practical to improve the Concord Turnpike to interstate standards as a limited access highway but that it would be more desirable to construct an entirely new route through Medford, Winchester and Woburn in order to provide these towns with a high speed limited access facility and a connection to Route 38. Thus, this section of the expressway through Somerville will serve two areas, one contiguous to the Concord Turnpike through Arlington and Belmont and the other to the north via Medford, Winchester and Woburn.

This expressway begins at the belt route in Somerville near Washington Street and the alignment then parallels the Boston and Maine Railroad as far as Sherman Street and Rindge Avenue. At this point a short connection is made with the Concord Turnpike. The main route continues in a northerly direction and crosses the Alewife Brook Parkway and Massachusetts Avenue. From this point it follows the east banks of the Mystic Lakes thru Medford and Winchester. Many studies were made to determine the most feasible location that could be utilized in passing through Winchester. The one selected involves a minimum of property taking while at the same time efficiently serving the business section of this town. Continuing over Wedge Pond on a filled causeway, the route bears to the northwest to terminate at existing U. S. Route 3 near Bedford road. From this point it will be possible to further develop U. S. Route 3 to the northwest either along the existing alignment or via the Middlesex Turnpike.

A branch connection by-passing Woburn to the west leaves the expressway at Horn Pond and terminates at existing Route 38 near Alfred Street, approximately one mile north of Central Square. At this point ample space is available for a future interchange connection with the proposed circumferential Route 128.

By paralleling the railroad through Somerville and Cambridge the location utilizes areas in which property values are generally declining while at the same time providing the most direct connection to the center of downtown Boston. By following the Mystic Lakes for a portion of its distance a minimum of property taking is required. The existing Mystic Valley Parkway can remain by extending the lake shore lines where necessary for the proposed expressway. In passing through Winchester it is proposed to use a cut and cover tunnel for the few short blocks traversed by the expressway, to preserve the desirable residential area through which it passes. Both sections of the expressway further to the north pass through open territory, in which no problems other than terrain are involved. Along this expressway, ramp connections to important surface streets are provided as follows:

| | |
|---|---|
| Washington Street | Somerville |
| Porter Square | Cambridge |
| Massachusetts Avenue and Alewife Brook Parkway | Cambridge and Arlington |
| Route 60 — High Street | Medford |
| Bacon Street | Winchester |
| Palmer Street | Winchester |
| Pond Street | Winchester |
| Pleasant Street | Woburn |

## NORTHERN EXPRESSWAY

Traffic from north to south through the north central section of the Metropolitan Area is generally served by five routes, namely, the Northern Artery, the Fellsway west and east, Main Street in Malden and Broadway in Everett. The Northern Artery, an existing six lane undivided road through Somerville connects the Fellsway routes to downtown Boston via the Charles River Dam. This highway presently carries the heaviest concentration of traffic in the entire Metropolitan Area amounting to an average of 50,000 vehicles daily. The west Fellsway is a fairly adequate four lane divided highway designated as Route 28. However, its utility is limited by the fact that portions of the route are restricted to pleasure car operation. The east Fellsway which connects with U. S. Route 1, the Newburyport Turnpike, is two lanes wide and limited entirely to pleasure vehicles. Both Main Street and Broadway are very narrow congested thoroughfares which pass through the business and residential areas of Malden and Everett. It would not be feasible to improve either street to increase its traffic capacity. Traffic from both of these arteries now moves via the Alford Street bridge, congested Sullivan Square and Rutherford Avenue enroute to downtown Boston. A location for an expressway in the north central area has therefore been selected, which coincides very closely with the desire line passing through the Malden, Everett,

Melrose area. Traffic on the western edge of this desire band can use the existing Fellsway and traffic to the east would use the Northeast expressway described hereinafter.

Developing a location for this route involved a study for further improvements to surface streets via Sullivan Square and Rutherford Avenue as supplemental facilities to serve traffic from the southern portion of the Malden, Everett area. The traffic analysis indicates a large flow of traffic via Route 28 which connects with important industrial cities in northern Massachusetts and major highways to Maine and New Hampshire. This route is subject to very heavy week end peak loads during the greater part of the year, particularly during the racing season in New Hampshire.

Because this expressway is expected to handle one of the largest volumes of traffic in the entire system, it is recommended that it be led into the central area of Boston on an independent route and that no connection be made with the inner belt and Central Artery, in order to facilitate the distribution of traffic at its southern terminus. The existing Northern Artery because of its great width has been selected as being adequate for this purpose. Openings of the Charles River Dam Bridge should be restricted during rush hours because of the heavy flow of traffic on this artery. Surface improvements along its entire length requiring only minor land takings would bring it up to expressway standards. These changes will represent a less costly undertaking than the building of an expressway in a new location through Somerville.

The complete northern expressway from the Charles River to its northern terminus is shown on Exhibits 16, 17, 18 and 19. The Northern Artery, the Charles River Dam to the Revere Beach Parkway should be the first section of this artery to be improved. The Fellsway from this point to the town of Stoneham can be utilized as the Northern Expressway in its existing condition for a number of years until further traffic increases require the completion of the balance of this route.

The new section of this expressway begins at the Revere Beach traffic circle and parallels the Boston and Maine Railroad through Everett and Malden to the Melrose city line. At this point a short connection is provided with Main Street to accommodate the Melrose and Wakefield traffic. From this point the alignment passes to the northwest to by-pass Stoneham and Reading to the east prior to connecting with Route 28.

A short connection between the Fellsway at Spot Pond and the new expressway will facilitate stage construction should it be decided that the Stoneham-Reading by-pass be constructed first. At its northern terminus a desirable location is available for a future interchange connection with Route 128. Service roads will be provided along the Northern Artery to effectively serve as points of egress and ingress to this improved facility. There follows a list of main intersecting highways where access to this highway is provided:

| | |
|---|---|
| Prison Point Bridge | Cambridge |
| Intersection with Belt Route (west bound only) | Cambridge |
| Washington Street | Somerville |
| Broadway | Somerville |
| Mystic Avenue | Somerville |
| Revere Beach Parkway | Medford |
| Medford Street | Malden |
| Pleasant Street | Malden |
| Main Street | Melrose |
| Wyoming Avenue | Stoneham |
| Franklin Street | Stoneham |
| Albion Street | Wakefield |
| Prospect Street | Wakefield |
| Route 128 (Proposed) | Wakefield |
| John Street | Reading |

## NORTHEAST EXPRESSWAY

Traffic flow in the Northeast section is divided between a route thru Everett and the North Shore route thru Chelsea,

Revere and Lynn. This traffic is presently served by Rutherford Avenue via Sullivan Square, Broadway in Everett, Chelsea Street thru Charlestown, Broadway thru Chelsea and Revere, U. S. Route 1, the Newburyport Turnpike, Routes 107 and 1A.

In considering the need for an expressway to the northeast it was found that one expressway between these two routes could serve this entire area. This location coincides with that now being developed for the new six lane high level Mystic River Bridge between Charlestown and Chelsea. By connecting this facility with the inner belt route and to highways to the northeast, a complete expressway is thus provided. At present a considerable amount of traffic which would otherwise use this proposed route travels via Route 1A and the Sumner Tunnel due to the congestion encountered in passing through Charlestown and Chelsea via the Chelsea Bridge. The desire lines show that when a new northeast expressway is completed a large portion of this traffic will be diverted from the Sumner Tunnel because of the more direct route provided. Thus the new northeast expressway will furnish needed relief to the Sumner Tunnel.

In order for this facility to properly service the northeast section, connections must be made to existing U. S. Route 1, an interstate highway, and to Routes 107 and 1A connecting with the city of Lynn and resort areas along the North Shore. This is accomplished by the use of interchange connections to U. S. Route 1 via the Cutler Highway and by a branch connection with Route 107 at the Revere traffic circle, and a further connection with Route 1A. Plans for the Northeast Expressway are shown in detail on Exhibit 20.

Route 107, a four-lane divided highway will serve as an expressway connection for all classes of traffic to the city of Lynn. By continuing from the Revere traffic circle to Route 1A, expressway traffic can thus reach the beach recreational areas and other North Shore points. As shown on Exhibit 24, the south end of the Mystic River Bridge Project included herein as a part of the Northeast Expressway, will connect to the Belt Route via a high level elevated highway over City Square. The estimates of cost include an item for revisions to the Mystic River Bridge approaches as now planned.

An examination of existing U. S. Route 1 from the new expressway to Route 128 indicates that, while this highway is adequate insofar as lane capacity is concerned, further improvements are necessary if it is to continue as a safe, efficient artery for the large volumes of high speed mixed traffic using this interstate route. Studies of various locations and comparisons of cost estimates have led to the conclusion that in this instance it would be more economical and expeditious to improve the existing highway to interstate standards as a limited access facility than to construct a new modern highway in a new location requiring the taking of expensive rights-of-way. This can be accomplished by acquiring the necessary property on one side of the existing highway sufficient in width to provide for service roads and other features necessary in the development of a limited access facility. In so doing additional interchange connections would be required at Lynn Fells Parkway and Broadway.

Access points on the new expressway are provided in the vicinity of City Square for connections with the Charlestown Bridge, the business section of Charlestown, Rutherford Avenue and the Prison Point Bridge.

Additional ramp connections are as follows:

| | |
|---|---|
| Everett Avenue | Chelsea |
| Fifth Street | Chelsea |
| Washington Avenue | Chelsea |
| Revere Beach Parkway | Revere |
| Park Avenue | Revere |
| Squire Road (International Highway) and Route C1, Cutler Highway | Revere |
| Broadway (Route 107), Squire Road (International Highway) | Revere |
| North Shore Road (Route 1A) | Revere |

In assigning traffic to this route, predictions are based upon

the completion of all expressways in the recommended system. Volumes have not been adjusted to the possible effects of different rates of toll or lack of toll on competing facilities.

## EAST BOSTON EXPRESSWAY

Two major desire lines of vehicular traffic terminates in the East Boston-Revere area. The volumes indicated are much lighter than on any other expressway section of the Metropolitan Area. It is also noted that movements are relatively short between termini. Presently, this traffic is served by the existing two lane Sumner Tunnel, connecting through inadequate routes with the Logan Airport and Route 1A to the northeast. This facility is now overtaxed primarily because it is being used by traffic detoured from other less desirable routes, as previously explained. Present plans however contemplate the immediate improvement of connections from the existing tunnel to the Logan Airport and the northeast. This improved facility known as the East Boston Elevated Highway and shown on Exhibit 21 is so designed that it will connect the Sumner Tunnel with the airport and provide a high speed expressway through East Boston to connect with the existing four-lane semi-expressway to the North Shore.

While assignment of traffic to this route solely on the basis of the 1945 Origin and Destination Survey reveals that the traffic load on the existing tunnel will be relieved upon completion of the Mystic River Bridge, it is clearly apparent from study of plans for the expansion of both passenger and freight business and attendant facilities at the Logan Airport within the next few years, that there will be increased traffic demands on the Sumner Tunnel. Because of this expansion, the normal increase in motor travel, and a substantial increase in industrial employment predicted for East Boston, such additional traffic volumes are indicated as to make the construction of a second tube necessary. This second tube should be in service as soon as possible after the airport expansion program is completed in order to accommodate the volumes of traffic anticipated. Traffic flow predicted for the year 1970, based upon a completed expressway system and the above factors, will be adequately served by a four-lane facility made up of two 2-lane tunnels operating as a pair of one-way arteries between downtown Boston and East Boston.

The second tube of the Sumner Tunnel should be reasonably close to the present tunnel to simplify the problem of ventilation, supervision and other operating functions. The two portals in downtown Boston should be as widely separated as feasible, however, to avoid conflict between vehicles entering one tube and those leaving the other. Furthermore, the combined load of traffic to and from the two tubes should be as widely distributed as possible, so that the traffic flow in the tunnels will not be retarded by the capacity of a few narrow streets.

A location for the portal of the second tube has been selected along the east side of Atlantic Avenue opposite Clinton Street with a branch on the west side of Atlantic Avenue along Richmond Street. The east approach to this portal will be accessible to trucks from South Boston or from the South Station and vicinity via Atlantic Avenue without conflict with traffic to and from the Central Artery. The other approach to the portal will be used chiefly by traffic from the downtown area north of the Common and the Central Artery.

This proposed location for the portal of the second tube will make it desirable, although not compulsory, to collect tolls at the East Boston end of this tunnel. This will have other advantages, such as concentrating toll collections in one area to simplify supervision, and also make possible a toll plaza of more generous proportions than could economically be provided in downtown Boston. Minor changes in the design of the East Boston Expressway will have to be made to conform with final details of these toll collection facilities.

The connections between the twin tunnels and the Central Artery have been so planned that the existing tunnel can continue to be used for two-way traffic if the Central Artery is com-

pleted before the second tube is built. After completion of the second tunnel, either tube can be used for two-way traffic in an emergency, the proposed layout of ramps and surface streets being so designed. In addition, the portals and expressway ramps are separated by a cushion of surface streets, and escape routes are provided to give maximum flexibility during surges in traffic, accidents, icy weather or other abnormal conditions.

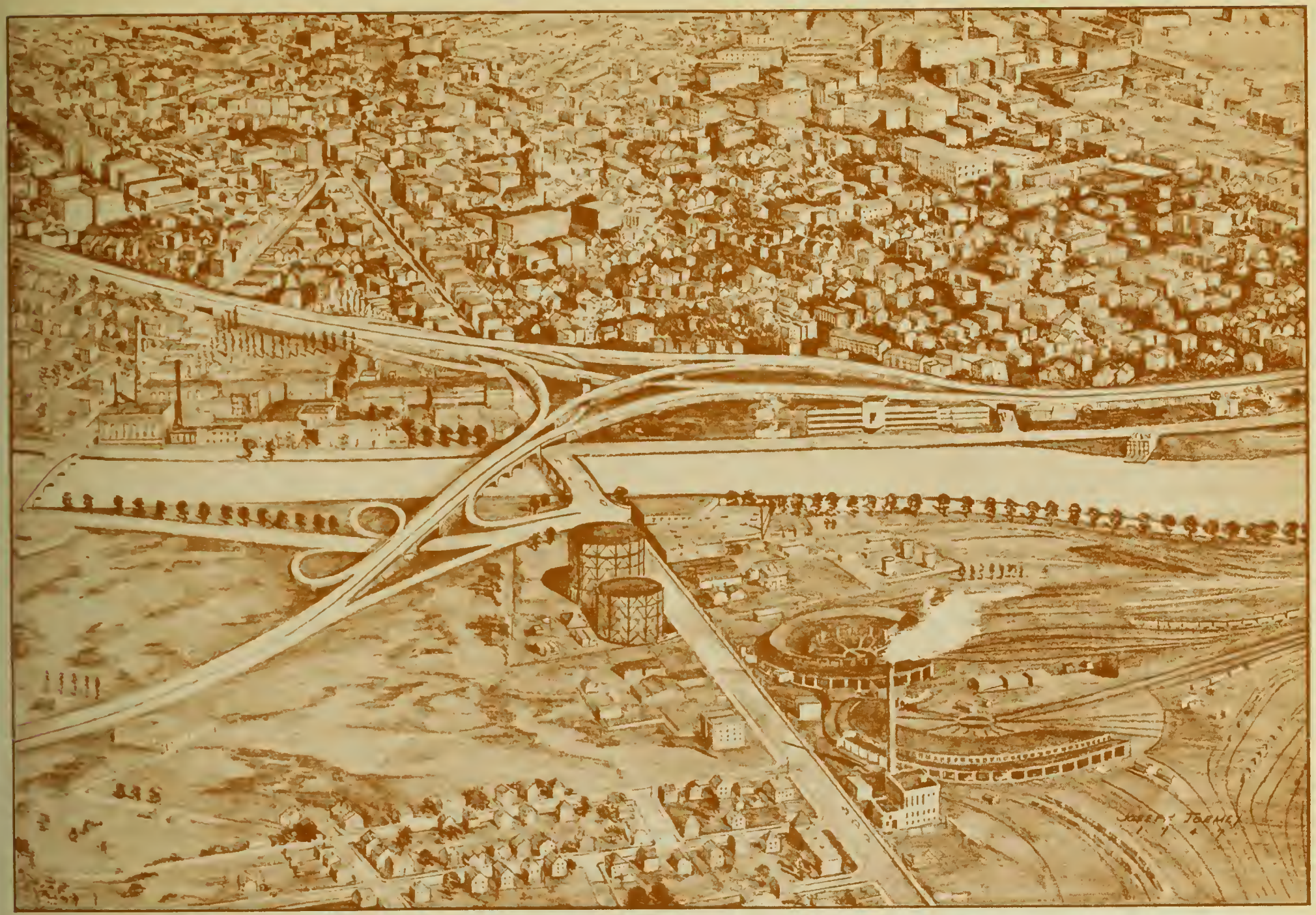
In addition to the Central Artery connection, an adequate interchange is provided for direct flow to the Logan Airport and a connection is made at its northern terminus with the existing McClellan Highway.

## BELT ROUTE INCLUDING CENTRAL ARTERY

An analysis of all charts portraying traffic movements, shows a large concentration of desire lines tangential to the borders of the downtown Boston area. One group of desire lines runs from east to west, parallel to and north of the Charles River. Another runs from north to south in a location near the Cottage Farm Bridge. The logical shape for an expressway to serve the heavy volumes of traffic indicated by the desire lines takes the form of a Belt Route circling the downtown area. This route as shown on Exhibits 22, 23, 24 and 25, will serve as a terminus for seven of the eight radial expressways. These radial routes are fairly well distributed around this entire Belt. In this manner the Belt will serve a double function in that crosstown movements can be accommodated as well as local movements. Traffic destined for the downtown section can be distributed adequately from the Belt at points where it intersects important arterial highways and city streets. The Belt will serve as a by-pass of the central area for traffic east to west, and north to south, which now must pass through the city's most congested streets. Thus there would be removed from the streets of downtown Boston a large portion of the 15,000 thru trips which now add to the confusion in this area.

In selecting a location for the Belt Route, a study of property values, access to important downtown points of origin and destination, and connections to existing important traffic arteries were prime considerations. Supplementing this route with an adequate system of surface streets described hereinafter, will facilitate the distribution of traffic from this Belt Route throughout the central area.

The selected route begins at the interchange between the Southeast and Southwest Expressways near Massachusetts Avenue and Southampton Street and extends in a westerly direction via Roxbury Crossing to connect with Huntington Avenue, the Jamaicaway and Brookline Avenue. From this point it extends in a northerly direction to cross Beacon Street and Commonwealth Avenue paralleling the Cottage Farm Bridge across the Charles River to connect with the Western Expressway. From this point the Belt Route passes through Cambridge in a northeasterly direction to Somerville to make an interchange connection with the Northwest Expressway in the vicinity of Washington Street. From this interchange it travels in an easterly direction paralleling the Boston and Maine Railroad, crossing its main yards to an elevated interchange just west of City Square, where it connects with the Northeast Expressway. The route proceeds in a southerly direction through the downtown business section to the point of beginning. This latter section of the route, termed the Central Artery, is described more fully under the section of this report on Downtown Boston Improvements. The Central Artery will connect with the Sumner Tunnel and important downtown streets. It is designed as an elevated highway, a cross section of which is shown on a delineation included herein. Ramps of adequate capacity, in locations strategically placed for the prompt and efficient dispersal of traffic will be possible on the recommended alignment. A number of alternate locations for the Central Artery were studied but were abandoned because of high real estate values, inadequate terminal facilities, and low traffic potentialities, in favor of the selected route.



CAMBRIDGE INTERCHANGE

In order to distribute traffic to and from the Belt Route, eleven intermediate access points, in addition to those on the Central Artery, are provided connecting with the major arterial highways intersected by this route. The location of these intermediate interchanges is shown on both the Belt Route exhibits and the plate which depicts traffic volumes and number of lanes on the expressways. In this manner traffic can travel around the circumferential route to reach its destination rather than pass through the area on existing congested thoroughfares. In all cases interchanges between the Belt Route and the radial expressways will provide for directional flow of traffic at standard design speeds and volumes. These large interchanges have been located in all cases in undeveloped areas so that the value of right-of-way takings is held to a minimum.

Interchange ramps connecting to important distributing traffic arteries are so designed and located that traffic can be dispersed without the danger of congestion on the expressway belt itself. The Central Artery, designated as a six-lane divided facility, is provided with a number of ramp connections to distribute the large volumes of traffic destined to the downtown area. An extra lane, in addition to the three lanes in each direction, is contemplated as an essentially continuous acceleration or deceleration lane in all sections except where the cost of right-of-way for this feature would be prohibitive. The cost estimates for both right-of-way and construction are on this basis. The provision of this extra lane will ease the handling of the heavy volumes of traffic estimated for certain sections of the Central Artery, and particularly the heavy movements on and off the various ramps.

A study of the 1970 traffic volumes indicates that daily two-way traffic on this belt varies from 41,050 vehicles near Memorial Drive to 88,700 vehicles near the Sumner Tunnel. While this Belt Route is somewhat larger than has been found necessary in other cities where comparable studies have been undertaken, it must be considered that an unusual number of radial routes are involved, that extensive areas of water are encompassed, and that several distinct business centers rather than the usual single center, are served. As previously explained the eighth expressway, the Northern Artery, will not feed into the Belt Route, but will connect to the downtown section via Charles River Dam, Charles Street and Embankment Road and improved surface streets thru downtown Boston. In this manner, traffic volumes on the Central Artery can be held down to a practical maximum.

## EMBANKMENT ROAD EXTENSION

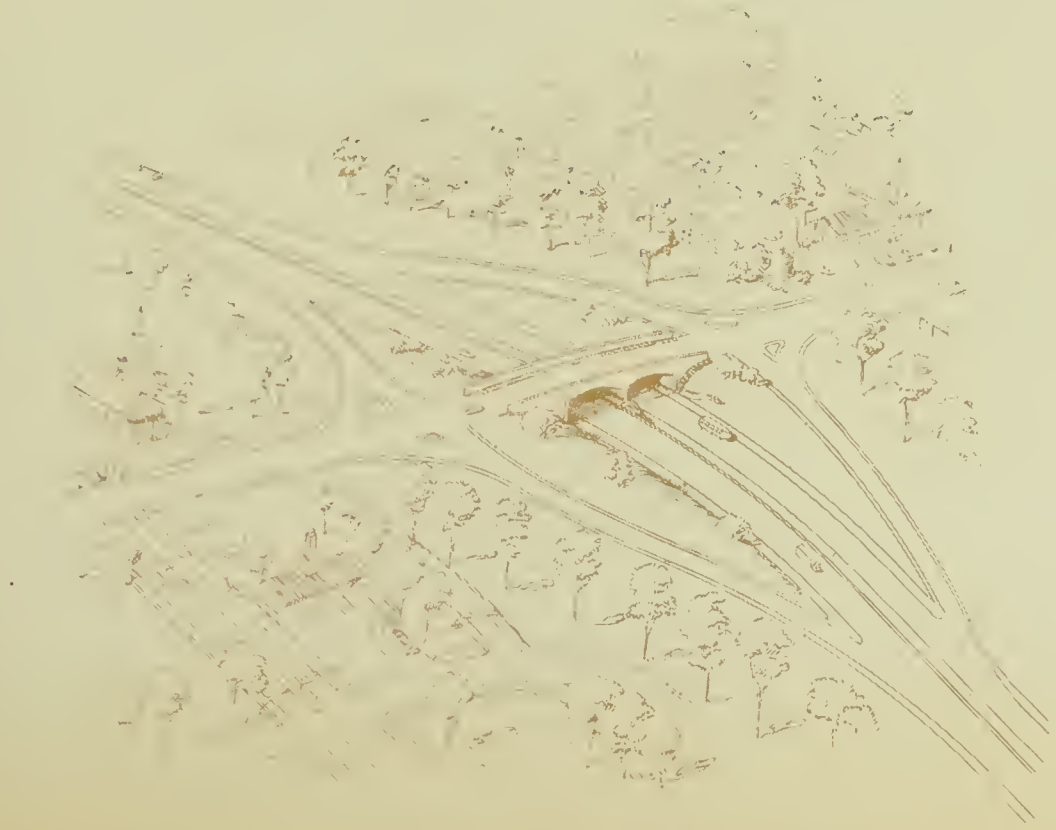
The traffic analysis indicates a very heavy desire line paralleling the Charles River Basin. Much of this traffic is predominantly local in character, and is now using Commonwealth Avenue and Beacon Street. There is considerable cross conflict on these streets which delays the major stream of traffic moving east and west. To improve this situation the Metropolitan District Commission has proposed the construction of a new facility, a six-lane divided highway of modified limited access design for the use of passenger automobiles. This plan includes the extension of the existing Embankment Road along the Charles River as far as Bay State Road near the Cottage Farm Bridge. This project, in supplementing the Belt Route, will serve a useful function in moving traffic between downtown Boston and areas which cannot otherwise be served by existing highways or the expressways proposed and it is recommended that it be included as an essential part of the Master Highway Plan. Estimates of cost for this improvement included herein are based upon figures prepared by the Metropolitan District Commission.

## ROUTE 128 — CIRCUMFERENTIAL HIGHWAY

The perimeter of the study area on which lie the outer termini of the radial expressways is approximately on the location of Route 128, a circumferential highway extending from the South Shore around the Metropolitan Area to the North

Shore. This highway is a project of the State Department of Public Works. Several sections have been completed as a four-lane limited access facility. Most of the route, however, follows existing narrow suburban roads at present. Plans of the Department include a new location for the remainder of this route together with a program for its ultimate completion. The total length of this highway from its beginning at Hull on the South Shore to Gloucester is over 80 miles. The location proposed is shown by a pink line on the folded map of the Metropolitan Area in the back of this report. Most of the route is in suburban areas beyond the limits of congested developments. The new location is such that right-of-way takings will be held to a minimum and the highway can be developed prior to further expansion of population outward from the Metropolitan Area. This highway should serve a useful purpose in connecting the various radial expressways and other important arterial highways, as well as a by-pass and outer distribution route. It will provide ready access to the North and South Shore recreational and residential areas for traffic from the Metropolitan Area and the western section of the state.

Available traffic data is not sufficient for the assignment of traffic to this route, therefore studies to determine the priority which should be assigned to its construction have not been included. This highway has been shown and described herein because of its relation to the over all plan. However, estimates of cost have been included in the companion report on state highway projects beyond the limits of the Boston Metropolitan Area prepared by the State Department of Public Works.



# ESTIMATES OF FUTURE TRAFFIC

The volume of traffic on the proposed expressway system will increase during the life of the structures over that estimated on the basis of the 1945 Origin and Destination survey. It is important to know the character of this trend to preclude the possibility that the highways will be either over-designed or under-designed. Projections of future traffic have been carried to the year 1970.

The most important factors to take into consideration are population changes including the possible redistribution of population, increases in vehicle ownership and increases in use of the average vehicle. A factor has also been applied to correct for the difference between traffic volumes as determined by the interview survey and volumes as determined at the screen lines by actual count.

The population of the Boston Metropolitan Area as a whole appears to be relatively stabilized. Population changes in the sections served by the individual expressway routes may deviate widely from the average, however. The 1970 population of each city and town in the metropolitan area and of each major subdivision of the City of Boston has been carefully predicted by the staff of the State Planning Board on the basis of availability of building sites, present trends, known plans for industrial expansion and other pertinent factors. This study has been invaluable to the consultants in their efforts to assign future traffic to each of the various expressway routes.

Other influences on future traffic volume, such as the Logan International Airport, have also been taken into consideration in arriving at expansion factors.

Total vehicle registration has been increasing steadily ever since the advent of the automobile. The factor of "population per private automobile", which takes cognizance of population as well as vehicle registration, has been declining steadily and can be expected to go still lower as improvements in traffic facilities make automobile ownership more attractive. Trends in this direction have been extended to 1970 with the aid of forecasts by the Massachusetts Department of Public Works, Highway Planning Survey.

The tendency throughout the country is for the average vehicle to be driven more miles per year as both the vehicles and the highways on which they operate are improved. The extent of increases in mileage per vehicle per year in the Boston Metropolitan Area will depend primarily on the rapidity with which the recommendations of this report are carried out.

It was determined from screen line counts that the home interviews revealed approximately 91 per cent of the daily ve-

hicular trips. Traffic volumes as determined for 1945 from the Origin and Destination survey have been expanded in the ratio of 100 to 91 therefore, before applying other expansion factors to estimate traffic volumes for 1970. All of these factors have been combined in the accompanying table to arrive at indices which, applied to 1945 traffic volumes, indicate the predictable expressway traffic in the year 1970 for each route.

In assigning traffic to the different sections of the expressway it was assumed that the proposed routes would be used whenever time would be saved in doing so, even though the distance was somewhat longer. At the same time consideration was given to the continued use of existing good roads, and the use of other surface roads recommended for improvement or as new construction.

The accompanying flow map shows estimated volumes of traffic which would use the complete system of expressways at 1945 traffic levels and also as estimated for 1970.

Another drawing shows the estimated 1970 two-way volumes of traffic on each section of the expressway system and on each pair of access ramps. This drawing also shows the recommended number of lanes in each section of the expressway system.

Following these two drawings is a list designating by number and location the various interchanges and access points.

ENLARGED DETAIL OF BELT ROUTE

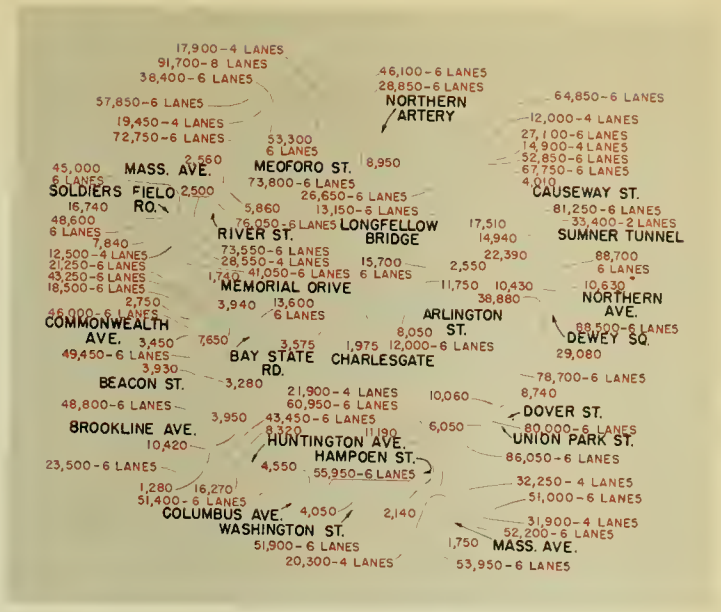
LEGEND

1945

5 INTERCHANGES (SEE TABLE)

60,000 TRIPS PER 24 HOURS (1970 ESTIMATE)

1945 ORIGIN AND DESTINATION SURVEY
ADJUSTED TO 100 PERCENT
AND ESTIMATED 1970 TRAFFIC VOLUMES




ENLARGED DETAIL OF BELT ROUTE

ESTIMATED 1970 TRAFFIC VOLUMES
AND
NUMBER OF LANES REQUIRED
FOR
EXPRESSWAYS AND ACCESS RAMPS

# EXPRESSWAY ACCESS POINTS

## SOUTHEAST EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 1. | Main Street | Weymouth |
| 2. | Union Street | Braintree |
| 4. | Independence Avenue | Braintree |
| 5. | Furnace Brook Parkway | Quincy |
| 6. | Adams Street | Milton |
| 7. | Gallivan Boulevard | Boston |
| 8. | Freeport Street | Boston |
| 9. | Columbia Road | Boston |

## SOUTHWEST EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 0. | Route No. 1 | Westwood |
| 1A. | East Street | Dedham |
| 2. | Route No. 135 | Dedham |
| 3. | Gordon Avenue | Boston |
| 3A. | Neponset River Parkway | Milton |
| 5. | Cummins Highway | Boston |
| 6. | Morton Street | Boston |
| 7. | Blue Hill Avenue | Boston |

## ROUTE No. 9

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 2. | Route No. 128 | Newton |
| 3. | Parker Street | Newton |
| 4. | Hammond Park Parkway | Newton |
| 5. | Chestnut Hill Avenue | Brookline |
| 6. | Brookline Village | Brookline |

## WESTERN EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 1. | Route No. 20 | Weston |
| 24. | Route No. 30 | Newton |
| 2. | Rumford Avenue—River Street | Newton |
| 3. | Route No. 128 | Newton |
| 5. | Galen Street | Watertown |
| 6. | North Beacon Street | Boston |
| 7. | Arsenal Street | Watertown |
| 8. | North Harvard Street | Boston |

## NORTHWEST EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 16. | Route No. 38 | Woburn |
| 17. | Route No. 3 | Woburn |
| 1. | Pond Street | Winchester |
| 2. | Lake Street | Winchester |
| 2A. | Bacon Street | Winchester |
| 3. | Route No. 60 | Medford |
| 4. | Massachusetts Avenue | Arlington & Cambridge |
| 4A. | Route No. 2 | Arlington |
| 5. | Rindge Avenue | Cambridge |
| 6. | Porter Square | Cambridge |

## NORTHERN EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 1. | Franklin Street | Stoneham |
| 3. | Wyoming Street | Stoneham |
| 4. | Main Street | Melrose |

## NORTHERN EXPRESSWAY—*continued*

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 5. | Pleasant Street | Malden |
| 6. | Medford Street | Malden |
| 7. | Routes No. 1 and 28 | Medford |
| 8. | Broadway | Somerville |
| 9. | Washington Street | Somerville |

## NORTHEAST EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 0. | North Shore Road | Revere |
| 1A. | Routes No. 60 and 107 | Revere |
| 1. | Squire Road | Revere |
| 3. | Park Avenue | Revere |
| 4. | Revere Beach Parkway | Chelsea |
| 5. | Washington Avenue | Chelsea |
| 5A. | Everett Avenue | Chelsea |
| 6. | Henley Street | Boston |

## EAST BOSTON EXPRESSWAY

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 2. | Neptune Road | Boston |
| 3. | Airport Connection | Boston |
| 4. | Porter Street | Boston |

## BELT ROUTE AND EMBANKMENT ROAD

| *Number* | *Name* | *Town or City* |
|---|---|---|
| 2. | Union Park Street | Boston |
| 3. | Dover Street | Boston |
| 4. | Dewey Square | Boston |
| 5. | Northern Avenue | Boston |
| 6. | Sumner Tunnel | Boston |
| 7. | Causeway Street | Boston |
| 8. | Henley Street | Boston |
| 9. | Belt over Northern Artery | Cambridge |
| 9A. | Medford Street at Northern Artery | Cambridge |
| 9B. | Northern Artery under Belt | Cambridge |
| 10. | Washington Street | Somerville |
| 10A. | Medford Street at Belt | Cambridge |
| 11. | Massachusetts Avenue | Cambridge |
| 12. | Soldiers Field Road | Boston |
| 13. | Memorial Drive | Cambridge |
| 14. | Embankment Road | Boston |
| 15. | Commonwealth Avenue | Boston |
| 16. | Beacon Street | Brookline |
| 17. | Brookline Avenue | Boston |
| 18. | Huntington Avenue | Boston |
| 19. | Columbus Avenue | Boston |
| 22. | Soldiers Field Road | Boston |
| 23. | Bay State Road | Boston |
| 24. | Charlesgate | Boston |
| 25. | Arlington Street | Boston |
| 26. | Longfellow Bridge | Boston |
| 27. | Nashua Street | Boston |

## *Route Expansion Factors*

| ROUTE | FROM | TO | 1970 Basic Factor | Population Factor for Tributary Area | Route Factor |
|---|---|---|---|---|---|
| Southeast Expressway | Main Street, Weymouth | Gallivan Boulevard | 1.77 | 1.2146 | 2.15 |
| Southeast Expressway | Gallivan Boulevard | Belt | 1.77 | 1.0000 | 1.77 |
| Southwest Expressway | Route 1 | Cummins Highway | 1.77 | 1.2503 | 2.22 |
| Southwest Expressway | Cummins Highway | Belt | 1.77 | 1.0000 | 1.77 |
| Worcester Turnpike | Newton-Weston Line | Hammond Pond Parkway | 1.77 | 1.3263 | 2.35 |
| Worcester Turnpike | Hammond Pond Parkway | Belt | 1.77 | 1.0000 | 1.77 |
| West Expressway | Route 30 | Galen Street | 1.77 | 1.1406 | 2.02 |
| West Expressway | Galen Street | Belt | 1.77 | 1.0000 | 1.77 |
| Northwest Expressway | Routes 3 and 38 | Route 60 including Spur | 1.77 | 1.0696 | 1.90 |
| Northwest Expressway | Route 60 | Belt | 1.77 | 1.0000 | 1.77 |
| North Expressway | Franklin Street | Main Street, Melrose, Spur | 1.77 | 1.0321 | 1.83 |
| North Expressway | Main Street, Melrose, Spur | Belt | 1.77 | 1.0000 | 1.77 |
| East Boston Expressway | McClellan Highway | Belt | 1.77 | 1.1000* | 1.95 |
| Northeast Expressway | Squire Road | Mystic River Bridge, including Spur | 1.77 | 1.0438 | 1.85 |
| Belt Route | All | | 1.77 | 1.0000 | 1.77 |
| Embankment Road | All | | 1.77 | 1.0000 | 1.77 |

* The East Boston area population factor of 0.8748 is increased to 1.10 because of Logan Airport expansion and anticipated industrial growth.

## *Computation of Factor for Expanding 1945 Origin and Destination Traffic Data to 1970*

| Year | Population of Massachusetts | Vehicle Registrations (Vehicles Operating) In Massachusetts | | Population Per Registered Auto | Gallons of Gasoline Per Total Motor Vehicle | Massachusetts Gas Consumption Road Vehicles Only | Expansion Factor Based on Gasoline Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Autos | Total | | | | For 1946 Traffic | For 1945 Survey Period |
| | | | | | | (add 000) | See Note | See Note |
| 1930 | 4,249,614 | 730,892 | 843,988 | 5.81 | 627 | 529,427 | | |
| 1935 | 4,350,910 | 680,537 | 785,672 | 6.39 | 745 | 585,035 | | |
| 1940 | 4,316,721 | 790,102 | 903,423 | 5.46 | 793 | 716,216 | | |
| 1945 | 4,493,281 | 744,364 | 861,252 | 6.04 | 619 | 533,480 | | |
| 1946 | 4,475,000* | 835,428 | 972,281 | 5.35 | 741 | 720,395 | 1.000 | 1.118 |
| 1950 | 4,540,000 | 950,000 | 1,067,000 | 4.78 | 833 | 888,000 | 1.233 | 1.378 |
| 1960 | 4,655,000 | 1,052,000 | 1,188,000 | 4.43 | 873 | 1,038,000 | 1.441 | 1.611 |
| 1970 | 4,700,000 | 1,119,000 | 1,269,000 | 4.20 | 902 | 1,143,000 | 1.586 | 1.773 |

• Estimated or derived. All figures for 1950 and later are estimated.

NOTE: Gasoline rationing was removed August 24, 1945, just prior to the survey period. Therefore, 1946, the first ration-free postwar year, was used as the base for expanding Gasoline Consumption. Based on Sumner Tunnel Traffic the ratio of the 1946 traffic to the traffic during the survey period was:

$$\frac{\text{Average Week 1946 . . . . . }}{\text{Average Week of 1945 Survey Period}} = \frac{162{,}168}{145{,}039} = 1.118$$

# IMPROVEMENTS IN DOWNTOWN BOSTON

An elevated highway across downtown Boston has been discussed for more than two decades. Various alignments have been proposed for this highway, which has been popularly called the Central Artery. The consultants reviewed all of these previous studies and then made a number of their own before selecting the route recommended herewith. The differences in this route from those previously proposed by other agencies are largely explained by the need for proper connections to the radiating expressways, many of which this report locates definitely for the first time.

## CENTRAL ARTERY

The recommended route for the Central Artery crosses the Charles River just above the present Warren Bridge. See the folded map of Downtown Boston in the pocket in the back of this report. The traffic on the expressway at this point will be that from the Northwestern and Northeastern Expressways. The Central Artery will not have sufficient capacity, however, to permit traffic from the Northern Expressway to use the Central Artery for downtown distribution.

The route of the elevated highway will cross Washington Street at Haymarket Square, follow Cross Street past the portal of the Sumner Tunnel and swing into an alignment parallel to Atlantic Avenue. It will pass Northern Avenue, then absorb the block between Purchase Street and Atlantic Avenue as far as Dewey Square. The route will thread between the larger buildings of the leather district beyond South Station, will cross the northwest corner of the Boston Terminal Company yards and thence continue south in the block between Hudson and Albany Streets.

The route will cross to the east side of Albany at Troy Street and continue parallel to Albany to the vicinity of Massachusetts Avenue where it will join the Belt Route. The Central Artery will provide connections, via the Belt Route, with existing surface arteries and with the expressway routes.

The most difficult problem on such a facility is to provide ramps sufficient in number and in the proper locations. Particularly in Boston, it is necessary that traffic to and from the Central Artery be well distributed over all available downtown streets. Even so, these streets will not be equal to the task, and it will be necessary therefore, to make several important surface street widenings and other major changes, as listed on Page 77.

This need for maximum collection and dispersion potential is one factor making it infeasible to use any route for a downtown expressway along the edge of the area, such as an alignment over the present piers extending into the harbor from Atlantic Avenue.

The recommended route for the Central Artery would provide ramps as follows:

| *ON Northbound* | *OFF Southbound* |
|---|---|
| Dwight Street | Haymarket Square |
| North of Broadway | Hanover Street and Sumner Tunnel |
| Dewey Square | Oliver |
| Northern Avenue and Oliver Street | Essex |
| Commercial and Sumner Tunnel | Oak Street |
| Hanover Street | Dwight Street |

| *ON Southbound* | *OFF Northbound* |
|---|---|
| Causeway Street | Union Park Street |
| Sumner Tunnel | Atlantic at East Street |
| Clinton Street | Congress Street |
| Broad and High Streets | Broad and High Streets |
| Congress Street | State Street and Sumner Tunnel |
| South of Kneeland | |
| Dwight Street | Causeway |

The average ON ramp in the downtown area will have to serve approximately 700 vehicles in the maximum P.M. hour by 1970, according to estimates of the consultants. The number of vehicles using the Central Artery and thus relieving the existing thorofares will be governed in large measure by the ability of the surface streets to deliver this many vehicles to each of the ramps. This means that traffic movement on tributary surface streets will have to be raised to a high level of efficiency.

## STREET WIDENINGS

### *Street Under Central Artery*

A surface street under or alongside the Central Artery will extend the full length of that elevated expressway. This street will have a central mall or its equivalent throughout, as well as other types of channelization to expedite the movement of traffic, as indicated in the Exhibit. There will be a minimum of three lanes of moving traffic in each direction with additional lanes for stopping of vehicles at the curb where appropriate.

This street will provide direct surface connections between the North and South Stations. Traffic between these two points now accounts for a large portion of the intra-area movement in downtown Boston. The street will also provide for surface traffic from these and other starting points to the produce and meat markets, the leather center, the wool district, the Haymarket Square area and other important commercial and retail sections along the route.

In addition, this surface improvement will collect traffic from the other downtown streets and lead it to the expressway ramps. In the reverse direction, the wide roadway will cushion the impact on the narrow surface streets of traffic leaving the expressway.

### *Portland Street*

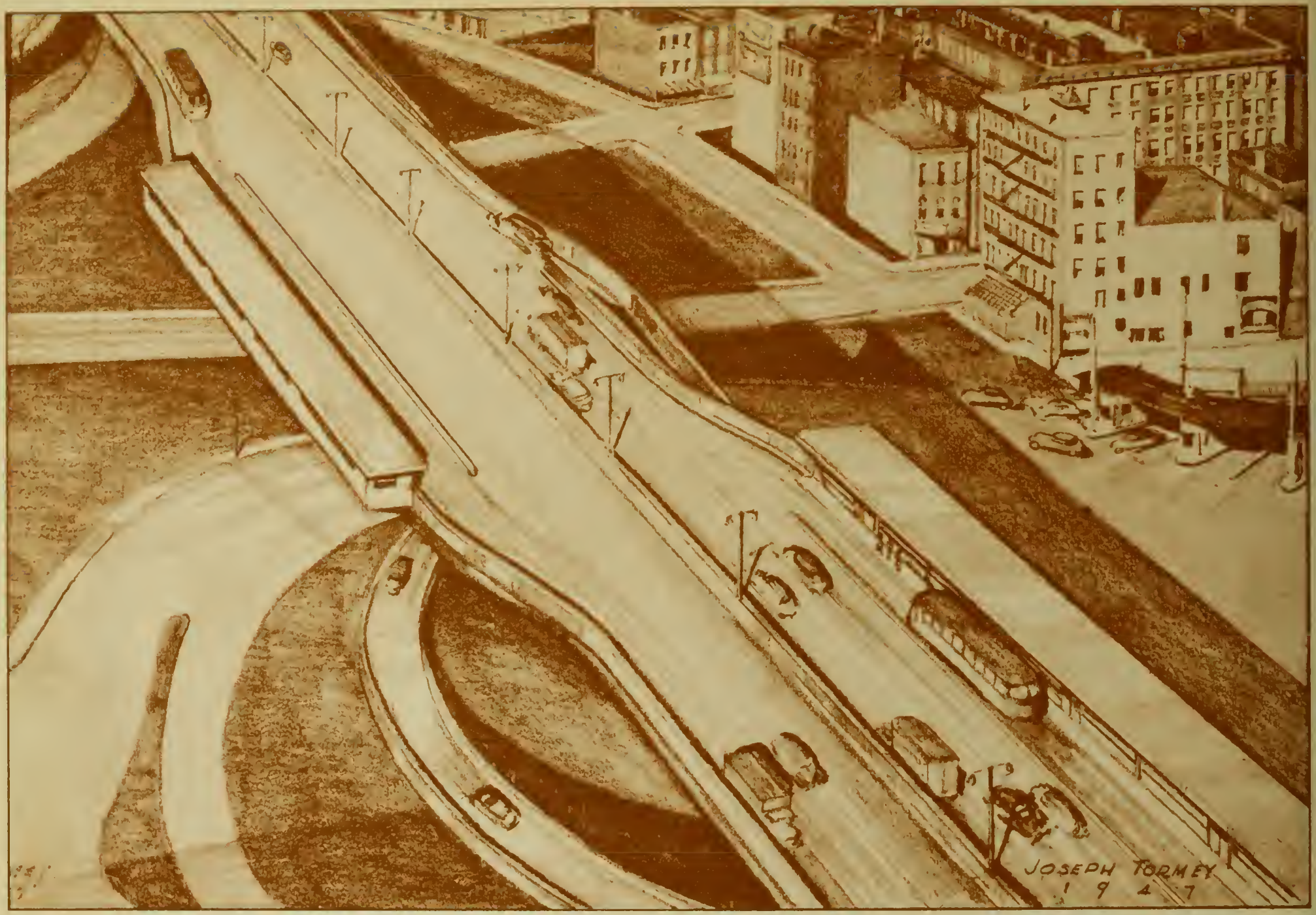
It is recommended that Nashua Street be extended as a wide thorofare to Sudbury Street. This will be accomplished by widening Portland Street on the southwest side from Causeway to Sudbury. The Portland Street widening will provide good facilities from the City Hall Area to the North Station and via Charles River Dam to Cambridge and beyond.

### *Sudbury Street*

The recommended widening of Sudbury Street from Cambridge Street and Scollay Square to Haymarket Square will complete a route from the Charlestown Bridge via Washington, Haymarket Square, Sudbury Street and Scollay Square to Tremont Street and thence to the Back Bay area. Also, with the Portland Street widening, traffic entering downtown Boston via Charles River Dam will be able to follow Sudbury to Scollay Square and thence to Tremont Street.

### *Connections to Back Bay*

The Central Artery along Albany Street, south of Broadway, will be separated from the active Back Bay area by a district one half mile in width which now has no streets suitable for heavy volumes of traffic. It is proposed that this difficulty be overcome




CENTRAL ARTERY IN THE VICINITY OF THE SUMNER TUNNEL

LONGFELLOW BRIDGE INTERCHANGE

by extending four presently adequate streets in the Back Bay area to Albany Street and the new expressway by three separate street widening projects. The widening and improvement of Castle, Motte and Way Streets from Tremont to Albany will provide a connection with Arlington Street under this plan. This will make a direct route for traffic from the vicinity of the Public Garden not only to the expressway, but also to the Broadway Bridge and to three important north-south streets between Tremont and Albany, namely Shawmut, Washington and Harrison.

The widening and extension of Dwight Street between Tremont and Albany will extend Clarendon and Berkeley as a pair of one-way streets. Under this proposal, Dover Street, with its street cars and truck traffic from South Boston, will not be used for the distribution of expressway traffic. The Dwight Street improvement will be used as a two-way artery.

The fourth of the Back Bay one-way streets, Dartmouth, will be connected to the Central Artery by way of Montgomery Street and widened Union Park Street.

## EMBANKMENT ROAD EXTENSION

The place of Embankment Road in the overall system of expressways has been discussed in an earlier section of this report. The distribution of its traffic in the downtown area of Boston, however, is a subject to be covered at this point.

Embankment Road will lie along the Charles River Esplanade and will connect with existing Embankment Road in the vicinity of Arlington Street extended. It is recommended that traffic entering and leaving the downtown area on the new road be connected with the previously mentioned four one-way streets through the Back Bay area.

The following pattern of access facilities is proposed in order to interchange traffic without unnecessary conflicts or hazards:

From northbound Dartmouth Street to westbound Embankment Road.

From eastbound Embankment Road to southbound Clarendon Street.

From northbound Berkeley Street to westbound Embankment Road.

From northbound Berkeley Street to northbound Embankment Road.

From southbound Embankment Road to southbound Arlington Street.

These proposed connections are clearly shown on the folded map of the downtown area in the back of this report.

## GRADE SEPARATIONS

The extension of Embankment Road will greatly increase the volume of traffic on the existing Embankment Road-Charles Street-Nashua Street artery. It will become necessary, therefore, to provide new roadways and structures at the inner ends of both the Longfellow Bridge and the Charles River Dam in order not to block these heavily used river crossings. The map indicates expansion of the facilities at the end of the Longfellow Bridge to provide a complete traffic interchange, incorporating both grade separations and rotary control. See delineation.

The problem at the Charles River Dam is less complicated. Adequate treatment at this location will involve, principally, a four-lane, two-way underpass between Charles and Nashua Streets.

## WARREN BRIDGE

The new Central Artery Bridge over the Charles River will carry much of the traffic now using the Warren and Charlestown Bridges. The Warren Bridge is worn out and due for replacement or removal. The proposed six-lane expressway bridge, together with the existing Charlestown Bridge, will furnish all the needed capacity for river crossings in this vicinity and the Warren Bridge will be needed no longer.

## ONE-WAY STREETS

Boston was one of the earliest and most successful exponents of the principle of one-way operation on narrow streets. There is no need, therefore, to expound on the merits of the one-way street system in downtown Boston. A limited number of changes and additions to this long-established system will be desirable, however, upon completion of the recommended street widenings and construction of the Central Artery.

The proposed one-way streets and direction of movement are shown on the folded map of downtown Boston in the back of this report. It will be seen that most of the differences between the recommended system and the one now in use have been occasioned by the need to expedite traffic to and from the widened streets, the new Embankment Road, and the ramps of the Central Artery.

The primary example of this principle is the proposed one-way movement southbound on Tremont Street. Much of the advantage of the proposed widenings of Portland and Sudbury Streets will be lost if traffic using these thorofares hits a bottleneck at Scollay Square. The logical continuation of these streets is via Tremont as a one-way artery to give superior accessibility to the retail shopping area.

## DOWNTOWN BOSTON

### Proposed Improvements to Existing Street System

Portland Street — Sudbury Street to Causeway Street
Sudbury Street — Haymarket Square to Scollay Square
Scollay Square — Sudbury Street to Court Street
Cambridge Street — Scollay Square to Charles Street
Castle Street — Arlington Square to Central Artery
Dwight Street — Warren Street to Central Artery
Union Park — Montgomery Street to Central Artery
Adams Square — Dock Square to Washington Street
Street under Central Artery
Longfellow Bridge and Embankment Road
Commercial Street — Washington Street to Charlestown Bridge
Beacon Street and Charles Street
Boylston Street and Charles Street
Dewey Square
Miscellaneous Traffic Signals (approximately 25 intersections)
Dartmouth Street at Boylston Street
Dartmouth Street at Huntington Avenue
Dartmouth Street at Stuart Street
Dartmouth Street at Tremont Street
Berkeley Street at Tremont Street

# MAJOR STREET SYSTEM

STREETS AND HIGHWAYS HAVE BEEN SELECTED TO COVER the entire metropolitan area with a network of high-type surface facilities. With minor exceptions, these roads now exist and can be brought to a reasonably high level of efficiency without extensive takings of right-of-way or heavy construction. Thus, this network can be made to serve during the period that will be required to finance and construct the comprehensive system of expressways recommended.

## NETWORK OF ARTERIALS

Even after all of the expressways have been built, the recommended system of major streets will continue to fill an important place in the overall traffic pattern. These streets will collect traffic in the countless business centers and residential neighborhoods and carry that traffic to the nearest point of access on the expressway system. In the reverse direction the major street system will distribute the expressway traffic to the local destinations of the individual vehicles.

A large number of vehicular trips made in the Boston metropolitan area will not be served by the expressway system. The major street system will supplement the expressways, therefore, in providing facilities for short trips as well as for both cross-town and radial movements in areas where the total volume of traffic is too light to justify the construction of a limited access highway.

*Standard Cross-sections*

Suggested standard cross-sections for the arterial streets have been prepared and are illustrated on Page 91. These standards should guide the building of center malls in wide streets upon the removal of street car tracks. This type of improvement will affect many miles of streets during the next few years. These recommendations should also be followed in acquiring rights-of-way for street widening projects so that lanes, center malls, and marginal strips will all be of ample width without being excessive.

Many of the rights-of-way needed to meet these standards can be acquired most economically by establishing legal set-backs for future buildings. Property can then be purchased gradually as funds become available, alterations to existing buildings will be held to a minimum, and the capacity of the arterial street system will grow with the inevitable increases in traffic volumes.

There is no implication that these standards should be followed blindly. Variations and modifications may be employed, within limits, as dictated by conditions. A painted center line

may be substituted for a center mall, for example, if the specified width of roadways can be obtained in no other practical way. Safety and efficiency will be sacrificed in so doing, however. Lane widths can be narrowed only with a loss in convenience, safety and capacity; reduction in width of marginal strips will affect appearance; narrow malls will not provide the shadowing effect for turning vehicles. Such compromises are suggested only to meet such practical problems as cost, land use and stage development.

It is proposed that the designated major streets be made attractive to motorists and safe to use by preferential treatment. The pavement on these arteries should be maintained in first-class condition, crowns should be kept low, and radii of curb returns at cross streets increased. Traffic signs, signals and markings in conformance with the national Uniform Manual for Traffic Control Devices should be applied to the degree found necessary by competent engineering studies to assure the safe and expeditious movement of traffic and the protection of pedestrians.

Modern street lighting has proven effective in reducing the toll of traffic accidents. It is just as true, but less often emphasized, that good lighting results in time savings for motorists and increases the capacity of streets. Standards have been established by the Illuminating Engineering Society for the lighting of arterial streets under various conditions of traffic volumes, type of pavement and other factors. All of the streets designated herein as part of the network of arterial streets should have modern street lighting in keeping with the Illuminating Engineering Society standards.

The major streets will continue to intersect, as they have for 300 years, in the numerous squares for which cities and towns in New England are noted. The consultants have made studies of many of these locations where serious traffic congestion is known to occur.

Competent plans prepared by accredited agencies have been found for the correction of many of these problems. Construction has been held in abeyance, in most cases, pending an opportunity to review the proposals in relation to the Master Highway Plan and other major programs. This has been a wise policy, since many spots which are now scenes of serious congestion each day will be vastly improved by the construction of expressways or by other contemplated changes. For example, most of the traffic now plaguing City Square, Charlestown, will be lifted above surface congestion and carried on the recommended expressways from the Central Artery to the north via the Mystic River Bridge or to the west through Cambridge. On the other hand, the present traffic problem at Sullivan Square will not be sufficiently alleviated by the expressway system to justify postponement of consideration for major corrective measures at this location.

The modernization program now moving forward under the guidance of the Metropolitan Transit Authority also will eliminate many street traffic problems. In some cases the correction will come through the substitution of rubber-tired vehicles for present street cars while in others the extension of rapid transit facilities can be expected to reduce the load of traffic on streets paralleling the new rail facilities.

The re-location of the market district, the construction of a union truck terminal and the provision of off-street parking facilities will all have their beneficial effect.

All of these factors were considered in selecting the locations, indicated by numbers on the area-wide folded map and listed herein, requiring such major treatment as channelization, provision for rotary movement, grade separations, or by-passes. In many instances it has been possible to make only general recommendations, while in others sufficient traffic data were available to justify the making of rather specific proposals.

## LOCATIONS OF PROPOSED IMPROVEMENTS TO EXISTING HIGHWAYS

| *No.* | *Location* | *City, Town or District* |
|---|---|---|
| 1 | Southern Artery at Washington Street | Quincy |
| 2 | Southern Artery at Coddington Street | Quincy |
| 3 | Quincy Square | Quincy |
| 4 | Southern Artery at Hancock Street | Quincy |
| 5 | Granite Avenue and Adams Street | Milton |
| 6 | Cummins Highway at Mattapan Square | Mattapan |
| 7 | Blue Hill Avenue at Morton Street | Dorchester |
| 8 | Roslindale Square at Washington Street | Roxbury |
| 9 | Morton Street and Washington Street (Forest Hills Station) | Jamaica Plain |
| 10 | Columbia Road — Uphams Corner | Dorchester |
| 11 | Andrew Square | South Boston |
| 12 | Dover Street at Dorchester Avenue | South Boston |
| 13 | Broadway at Dorchester Avenue | South Boston |
| 14 | Egleston Square | Roxbury |
| 15 | Jackson Square | Roxbury |
| 16 | Roxbury Crossing | Roxbury |
| 17 | Brigham Circle | Roxbury |
| 18 | Audubon Road, Riverway and Brookline Avenue | Back Bay |
| 19 | Commonwealth Avenue at Cottage Farm Bridge | Brighton |
| 20 | Commonwealth Avenue and Brighton Avenue | Brighton |
| 21 | Commonwealth Avenue and Harvard Avenue | Brighton |
| 22 | Coolidge Corner | Brookline |
| 23 | Village Square | Brookline |
| 24 | Cleveland Circle | Brighton |
| 25 | Commonwealth Avenue and Chestnut Hill Avenue | Brighton |
| 26 | Beacon Street and Centre Street | Newton Centre |
| 27 | Newton Corner | Newton |
| 28 | Union Square | Brighton |
| 29 | Cushing Square | Belmont |
| 30 | Harvard Square | Cambridge |
| 31 | Central Square | Cambridge |
| 32 | River Road and Lechmere Canal | Cambridge |
| 33 | Union Square | Somerville |
| 34 | City Square | Charlestown |
| 35 | Sullivan Square | Charlestown |
| 36 | Arlington Square | Arlington |
| 37 | West Medford Square to Bennett Delta | Medford |
| 38 | Main Street and Washington Street | Winchester |
| 39 | Broadway and Revere Beach Parkway | Everett |
| 40 | Malden Square | Malden |
| 41 | Broadway and Beach Street | Revere |
| 42 | Central Square | Lynn |
| 43 | D Street | South Boston |
| 44 | Jamaicaway from Huntington Avenue to Arborway | Jamaica Plain |
| 45 | Cottage Street Widening — Lee Street to Jamaicaway | Brookline to Roxbury |
| 46 | Commonwealth Avenue Improvements | Brighton to Newton |
| 47 | Market Street — Coolidge Avenue Bridge | Watertown and Cambridge |
| 48 | Cambridge Truck Route | Cambridge |
| 49 | Route 60, Waltham through Belmont to Arlington | |
| 50 | New Prison Point Bridge | Cambridge-Charlestown |
| 51 | Rutherford Avenue Widening | Charlestown |
| 52 | Harvard Street Extension | Medford |
| 53 | Mystic Avenue from Northern Artery to High Street, Medford | Somerville-Medford |
| 54 | Gravelly Creek Bypass of Medford Square | Medford |
| 55 | Revere Beach Parkway Bridge — over West Division B.M.R.R. | Medford |
| 56 | Revere Beach Parkway Bridge over Mystic River | Medford-Everett |
| 57 | Revere Beach Parkway Bridge over South Branch B.M.R.R. | Everett |
| 58 | Second Avenue Extension | Chelsea |
| 59 | Meridian Street Bridge | Chelsea-East Boston |
| 60 | Market Street By-pass | Lynn |
| 61 | Westerly By-pass | Saugus-Lynn |

Those locations which were most frequently nominated by interested agencies for the attention of the consultants, and which study revealed to be more or less of a permanent character, are indicated by the numbered dots on the map of the Master Highway Plan. There are many more locations which were studied by the consultants but were thought to be temporary in view of the contemplated programs of highway and transit improvements.

Plans for all of the locations shown could not be prepared in the absence of detailed information on traffic and on existing physical conditions. The work of the consultants did not include the gathering of such information. Most of the troublesome spots have been the subject of intensive study by qualified agencies, and these studies have been carefully reviewed. A number of them are illustrated herewith giving credit to the originating group.

The discussions of specific locations which follow are intended primarily to illustrate the range and variety of treatment which will be found appropriate to deal with the various intersections indicated on the map as the bottlenecks on the present and future arterial street system.

*Mattapan Square (6)*

An inexpensive plan for improvement of Mattapan Square is shown on Page 84. This plan includes elimination of angle parking, channelization of the intersection and installation of properly timed traffic control signals. The use of such expedients can effect remarkable results when skillfully applied.

*Morton Street and Blue Hill Avenue (7)*

Preliminary studies have been made for an overpass on Blue Hill Avenue at Morton Street. This improvement would cost approximately $500,000 and might also result in consequential damages to property in its vicinity. It is recommended that a much simpler treatment be tried at this location before giving further consideration to elaborate structures. The suggested plan, illustrated on Page 85, contemplates simple channelization and the operation of existing traffic signals by any one of the several types of automatically or manually reset timers which adjust the signals to favor the predominant movements at various times of the day. Such timers also make special provision for the peculiarities of Saturday and Sunday traffic. Rigid parking control is also an essential feature of the proposal.

The Southwest Expressway will eventually relieve this intersection of a large portion of its traffic, but turning movements will always be heavy.

*Arborway and Washington Street (9)*

It is recommended that this location be given intensive study by an appropriate agency in coordination with the Metropolitan Transit Authority which is preparing long-range plans affecting traffic conditions at this point. During the period that will be required to carry out these plans, traffic signals operated by a flexible timer should handle traffic in a satisfactory manner. Even with traffic signals, police officer protection will be required in rush hours because of the heavy pedestrian movements.

*Roxbury Crossing (16)*

This intersection will be called upon to handle more traffic, rather than less, by the building of the proposed expressway constituting the Belt Route. It is proposed, therefore, that the changes which will be necessary at that time to accommodate the additional traffic be made immediately so that surface traffic can have the benefits of the improvement at once. The plan consists basically of rotary control using existing streets primarily but also including a street extension which will ultimately be needed as a part of the expressway program.

*Park Drive-Brookline Avenue (18)*

A plan has been proposed by the Boston Park Commission for the treatment of the multiple intersections created by the

confluence of Park Drive, Brookline Avenue, Boylston Street, Fenway, Pilgrim Road and Riverway. A portion of Muddy River has been put in conduit toward the construction of this project. The plan consists primarily of two large traffic circles connected by two roadways bordering Muddy River. It appears that this treatment is adequate and well suited for the problem at hand.

*Cottage Farm Bridge and Commonwealth Avenue (19)*

This location will be relieved of a great part of its traffic by the construction of the Belt Expressway. It is recommended that vehicle-actuated traffic control signals be installed at the intersection, in the meantime, to expedite the widely fluctuating flow of traffic characteristics of this location.

Such signals will supplement the commendably efficient traffic officer regularly on duty at this intersection. Thus freed from the mechanical aspects of traffic control, he can give all necessary attention to turning vehicles and to pedestrians.

*Union Square—Somerville (33)*

It is the opinion of the consultants that this intersection can be competently treated by the construction of islands to channelize traffic and the installation of traffic control signals as shown herewith. Elimination of angle parking is fundamental to any plan for relief of congestion at this point.

The Belt Expressway will later draw a portion of the through traffic from Union Square.

*City Square—Charlestown (34)*

This neighborhood is presently the subject of intensive study by engineers for the Mystic River Bridge Authority. It is anticipated that coordinated plans between this agency and other bodies at interest will be prepared. The solution must take into account the widening of Rutherford Avenue and the rebuilding of Prison Point Bridge as well as the construction of approaches to the new Mystic River Bridge.

*Sullivan Square (35)*

Studies are now being conducted by the City Planning Board in cooperation with the State Department of Public Works for a vehicular underpass at Sullivan Square. Final recommendations must await the completion of comprehensive traffic surveys, but one of the tentative solutions for this complicated problem is shown on Page 89. This improvement illustrates the type of work on the local street system which will not be made obsolete by the construction of expressways.

*Revere Beach Parkway, Broadway and Main Street—Everett (39)*

Various agencies have studied the problem created by the intersection of Revere Beach Parkway with Main Street and Broadway in Everett. An artist's conception of a preferred treatment incorporating an overpass is shown herewith. The importance of Revere Beach Parkway as a major traffic artery and the present congestion suffered at this location justifies the rather costly solution shown. The usefulness of all of the traffic arteries involved will be materially increased by the improvement.

*Roslindale Square*

A plan has been prepared for correction of traffic conditions in the Roslindale Square business district. This incorporates parking control, provision of off-street parking facilities, traffic signals, one-way streets and a short extension of one street. This inexpensive and readily available solution is suggested as an alternate to a more expensive plan for the taking of right-of-way and the extension of Belgrade Avenue as a new thorofare between South Street and Washington. This latter plan was suggested by the Roslindale Board of Trade. The proposed Southwest Expressway will change the traffic pattern in this vicinity in that traffic now moving from Belgrade Avenue to Washington will then be primarily interested in getting from Belgrade to Cummins Highway.

The off-street parking facilities shown in the accompanying exhibit are those proposed by the Roslindale Board of Trade.

*Extension of Market Street—Lynn*

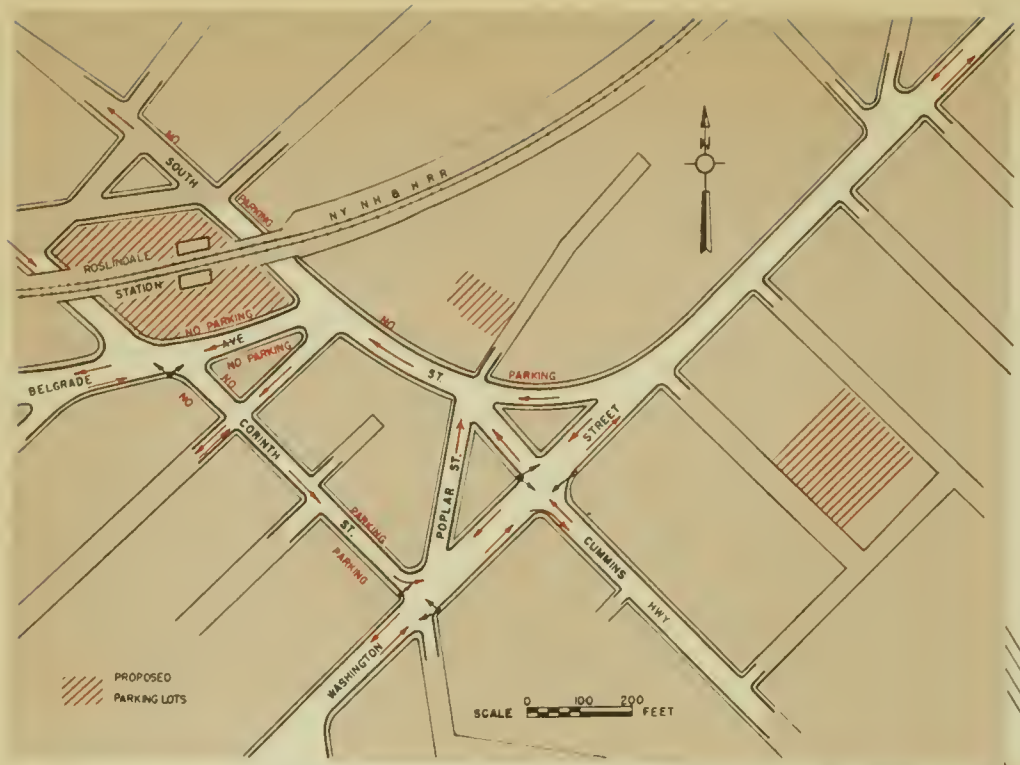
The City Engineer of Lynn has prepared preliminary plans for the extension of Market Street. These plans have been modified by the consultants to conform to the recommended standards for the major street system. In addition, channelization has been shown on the accompanying plan at each end of the improvement. This work will make a major contribution to the relief of traffic along the most congested portion of Washington Street in Lynn.

A by-pass route west of Lynn has been located as a result of reconnaissance surveys and is recommended as a part of the arterial street system. This general purpose highway would be on a new right-of-way through an area largely undeveloped at present. Through traffic would be removed from the congested streets of downtown Lynn to the benefit of all.

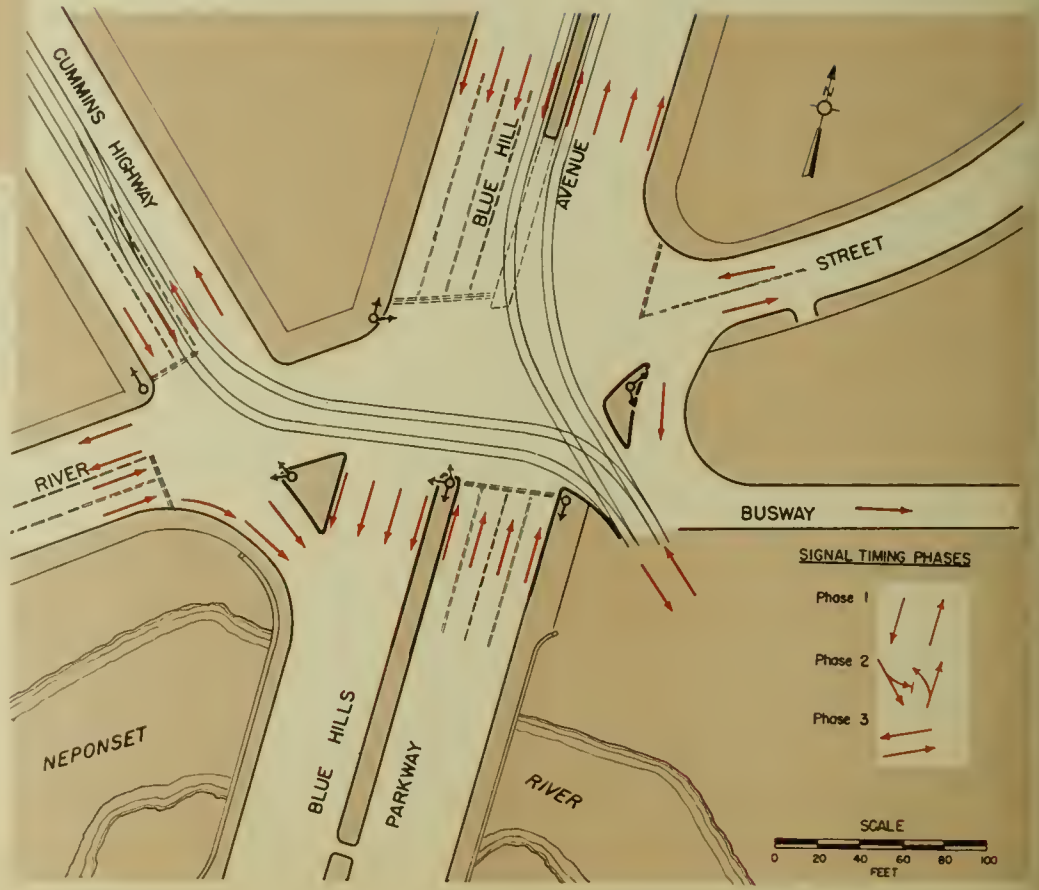
*Cambridge Truck Route*

A truck route in the City of Cambridge has been proposed by the Cambridge Planning Board. This would consist principally of existing suitable streets, but would also involve street extensions or widenings requiring additional right-of-way in five locations and a separation of grades with an existing railroad track.

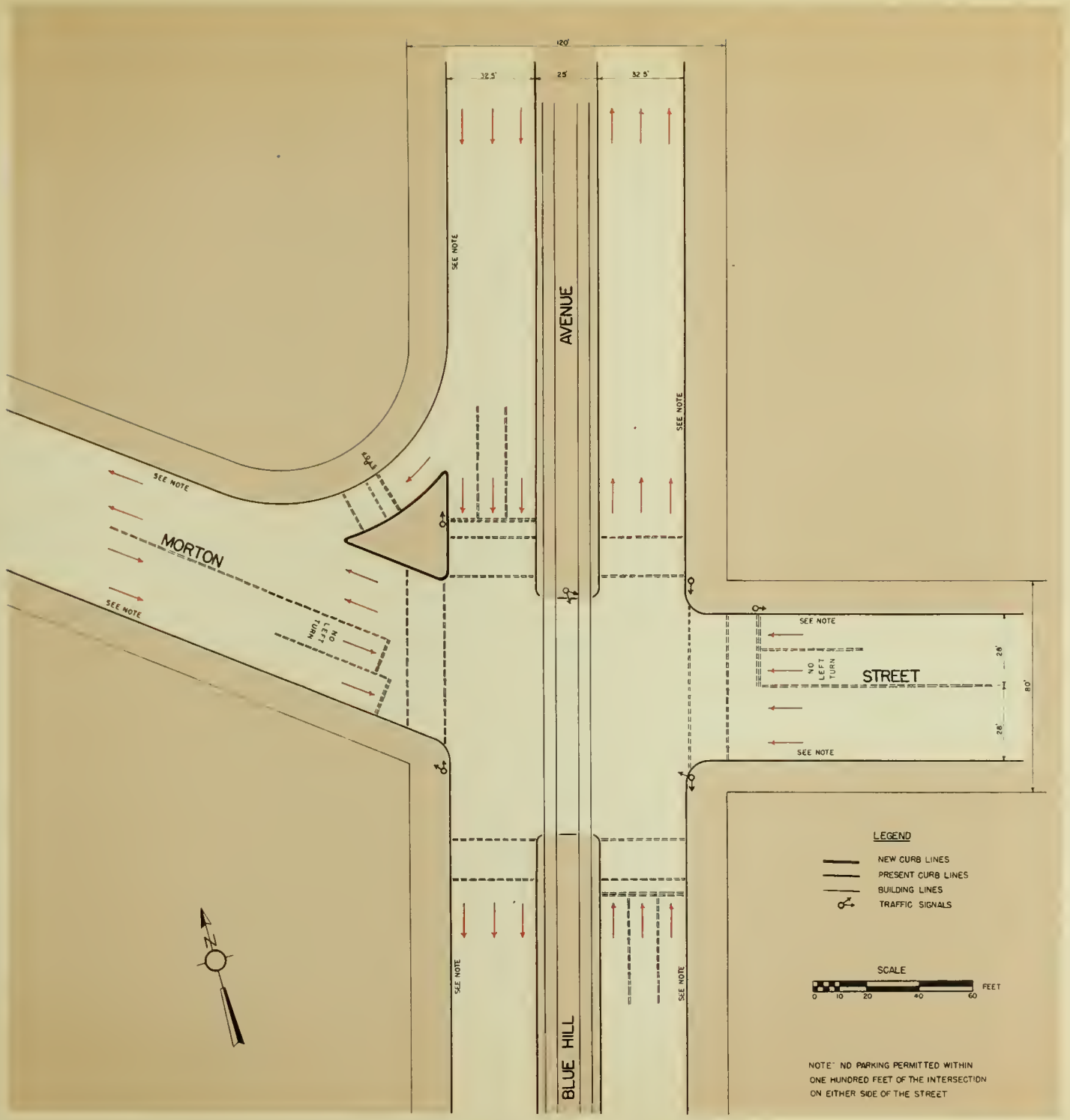
The consultants endorse this proposal and show it on the Master Highway Map as an improvement to be made as a part of the proposed arterial street system.



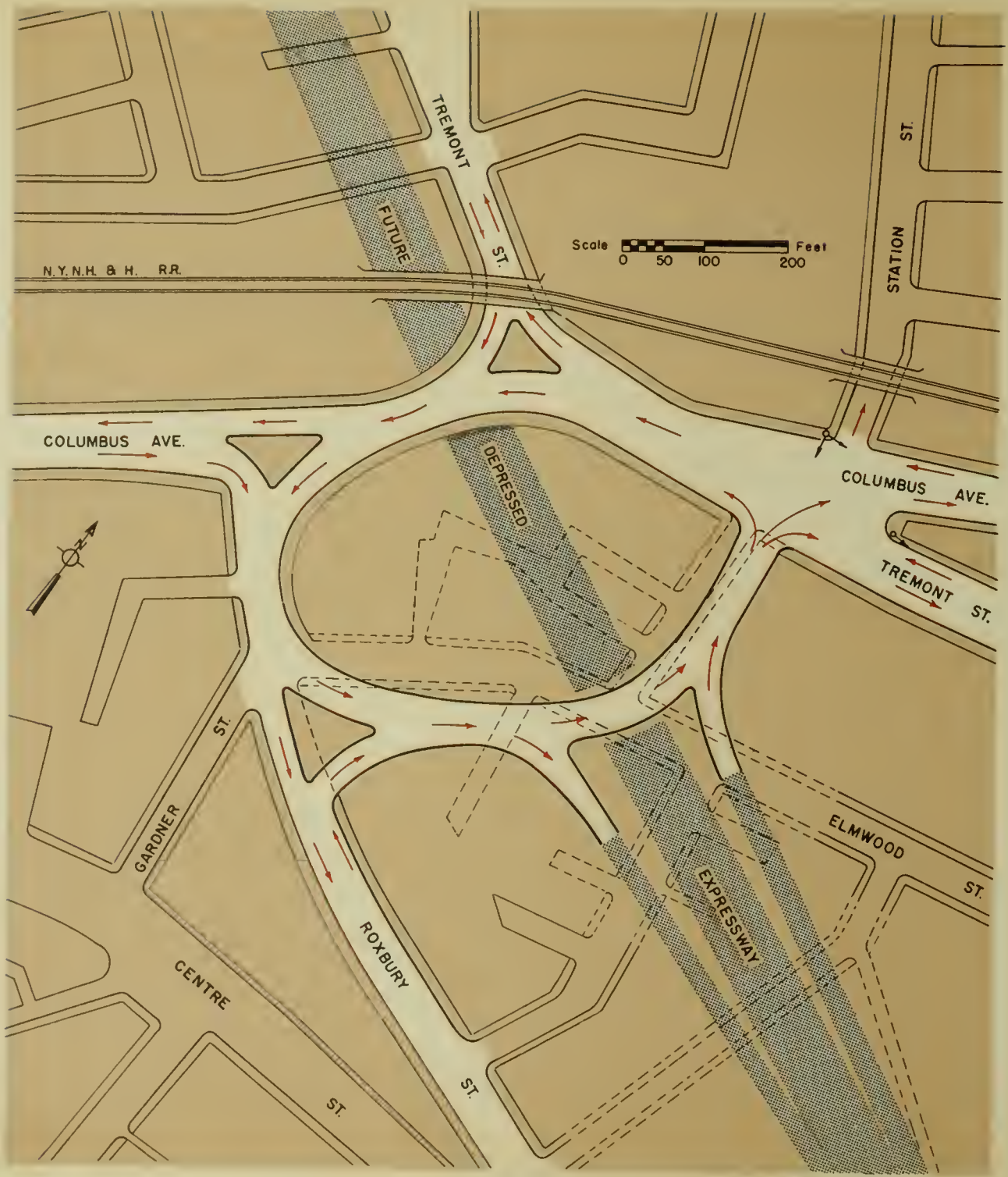

PROPOSED TRAFFIC IMPROVEMENT IN
VICINITY OF ROSLINDALE STATION



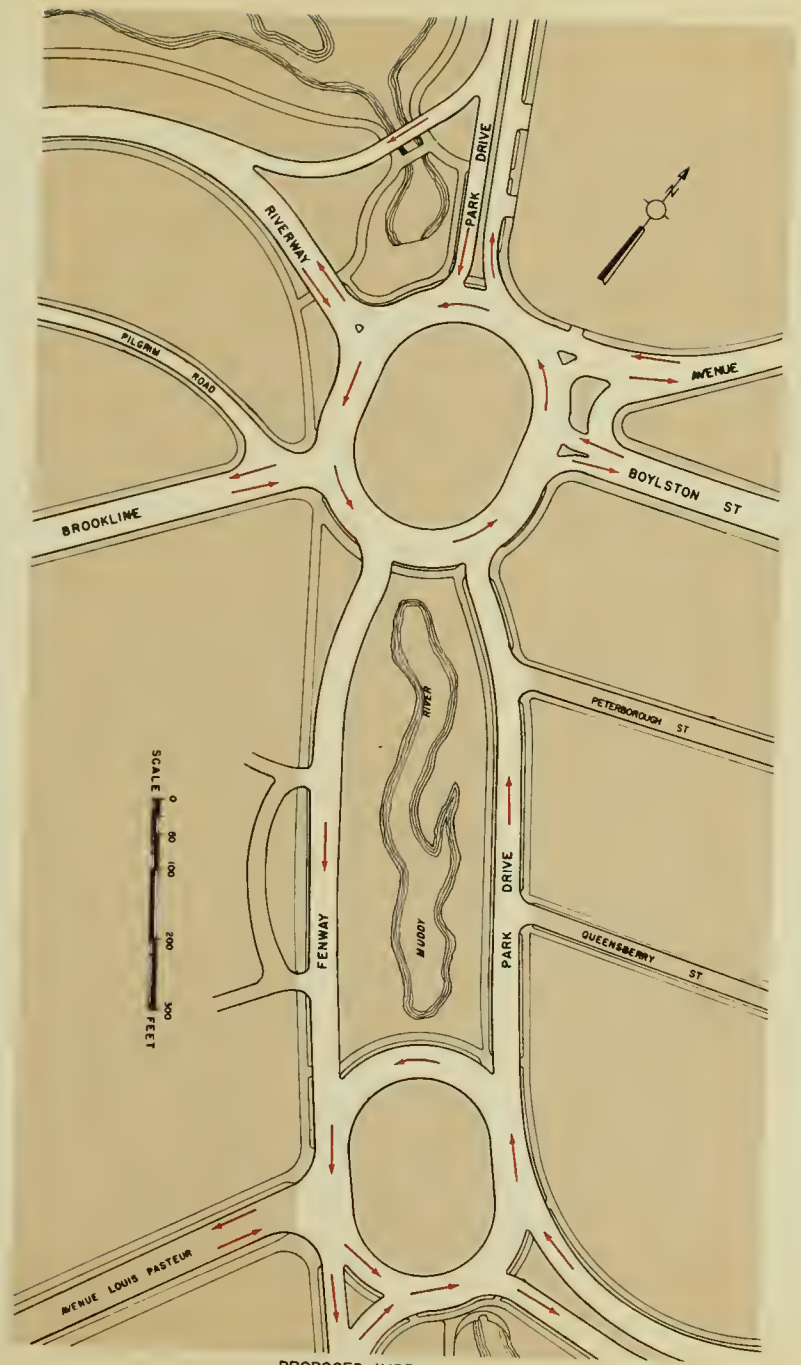

PROPOSED TRAFFIC IMPROVEMENTS
MATTAPAN SQUARE




PROPOSED IMPROVEMENTS FOR INTERSECTION
OF BLUE HILL AVENUE AND MORTON STREET
BOSTON, MASSACHUSETTS

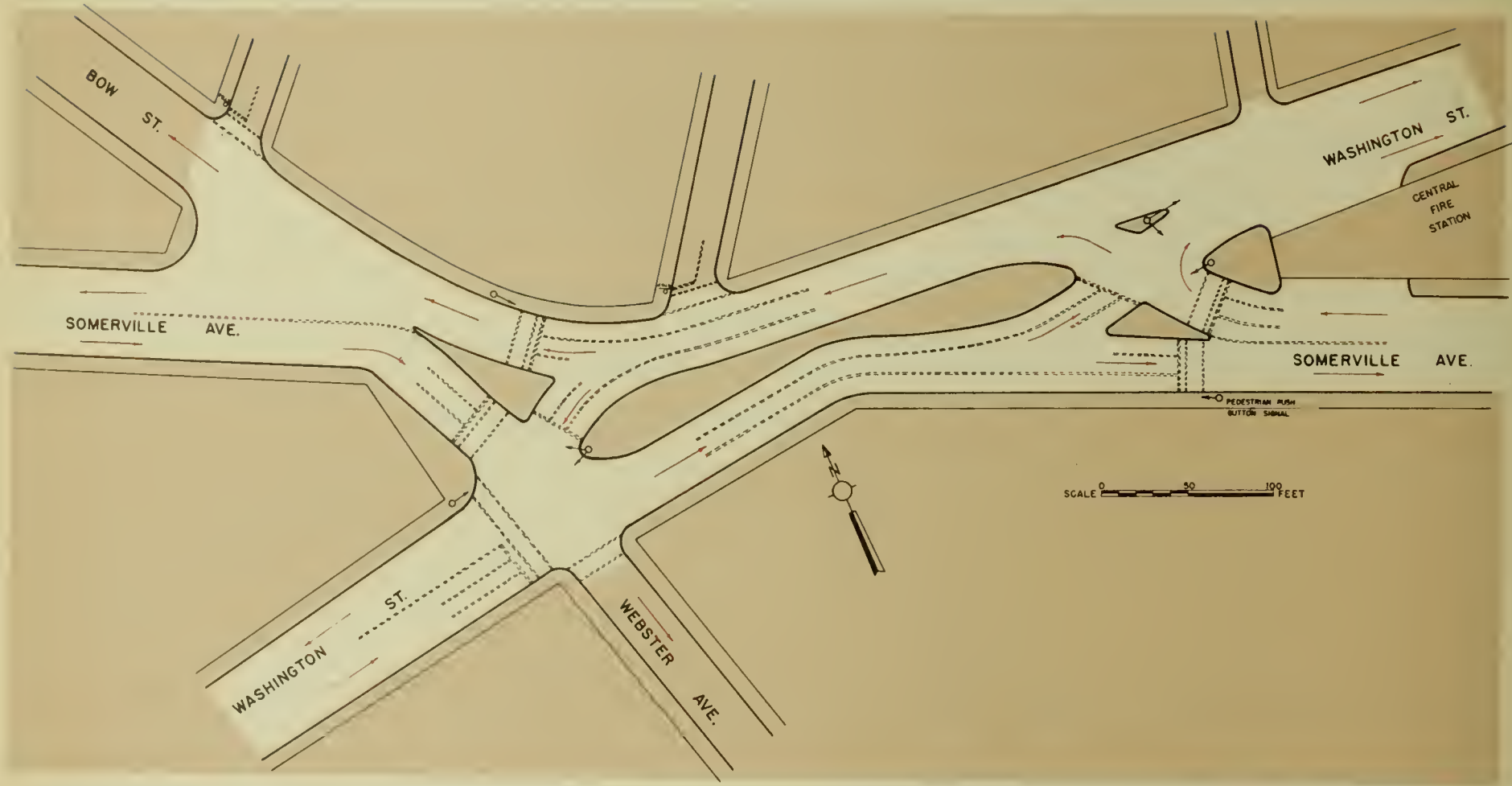



PROPOSED TRAFFIC IMPROVEMENT AT
ROXBURY CROSSING




PROPOSED IMPROVEMENT

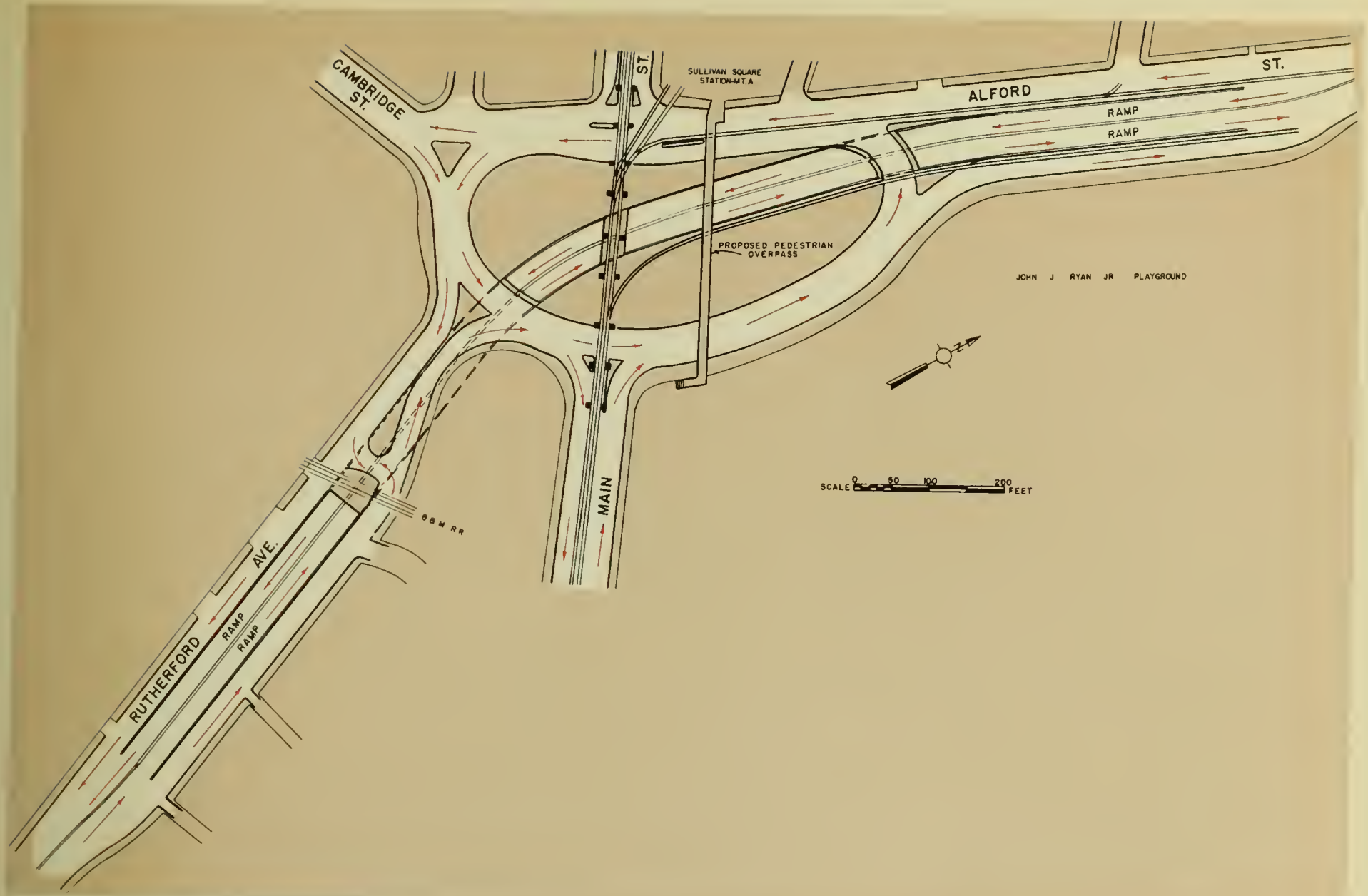
BROOKLINE AVE. & PARK DRIVE




PROPOSED TRAFFIC IMPROVEMENT

SOMERVILLE AVE. & WASHINGTON ST.

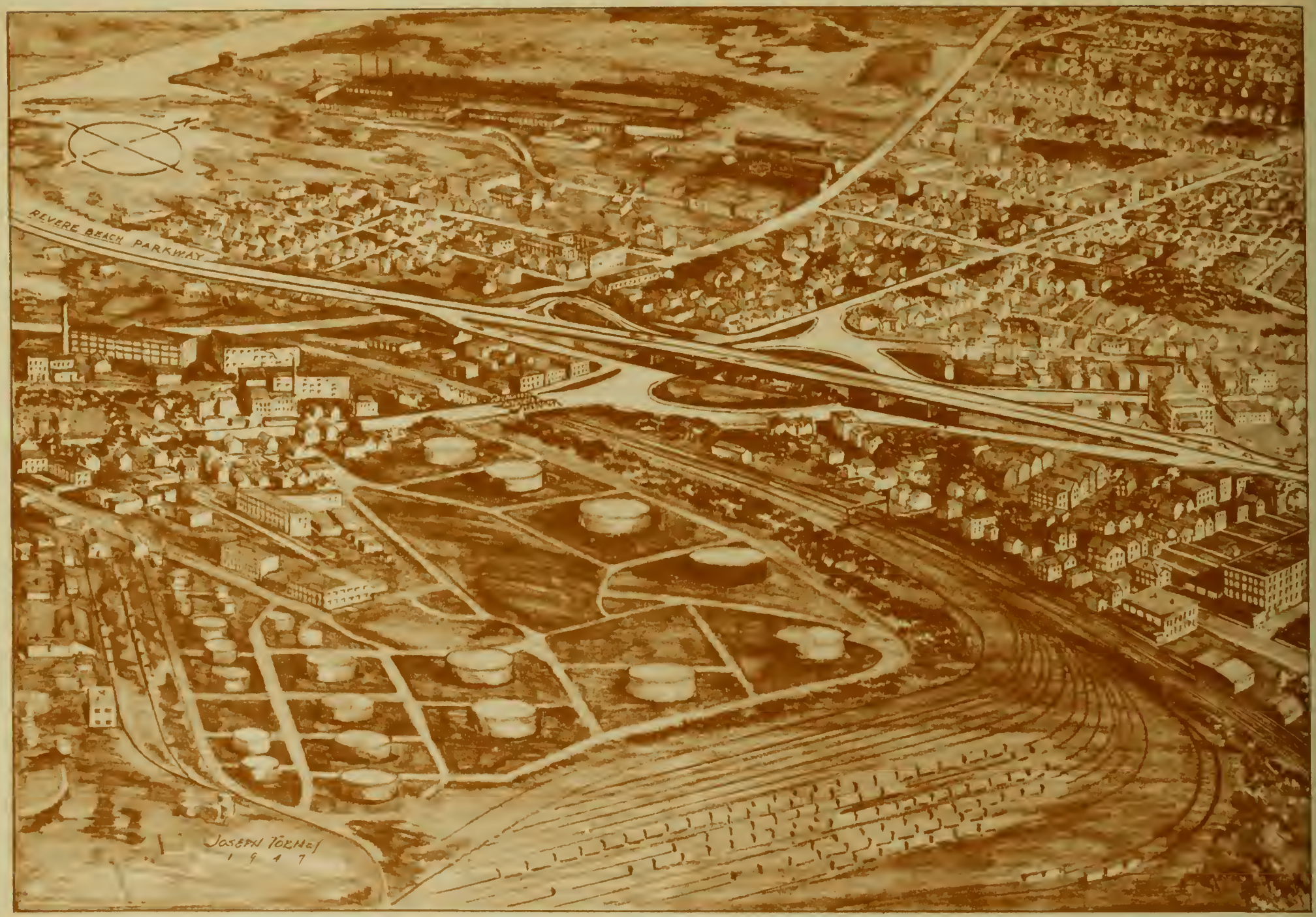
UNION SQUARE – SOMERVILLE




TENTATIVE PLAN FOR TRAFFIC CIRCLE AND UNDERPASS

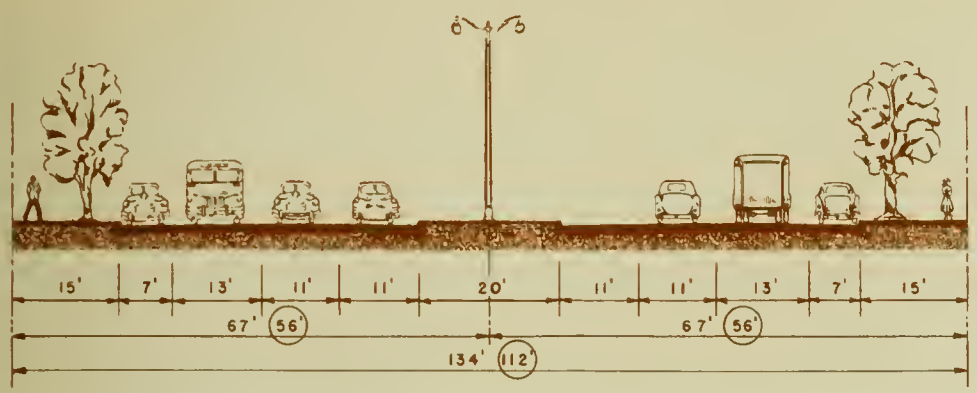
SULLIVAN SQUARE - CHARLESTOWN

BASIC DESIGN BY BOSTON PLANNING BOARD

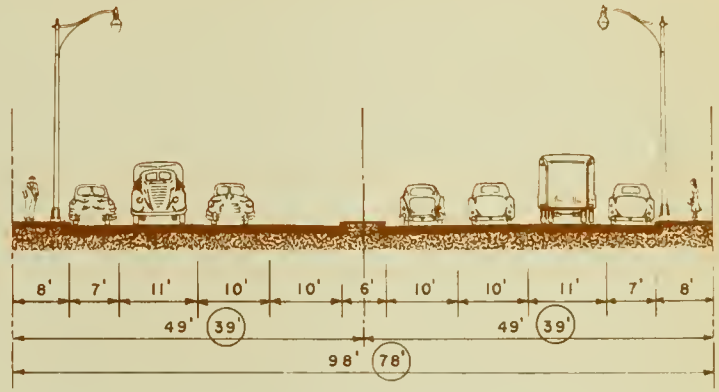



REVERE BEACH PARKWAY OVER-PASS

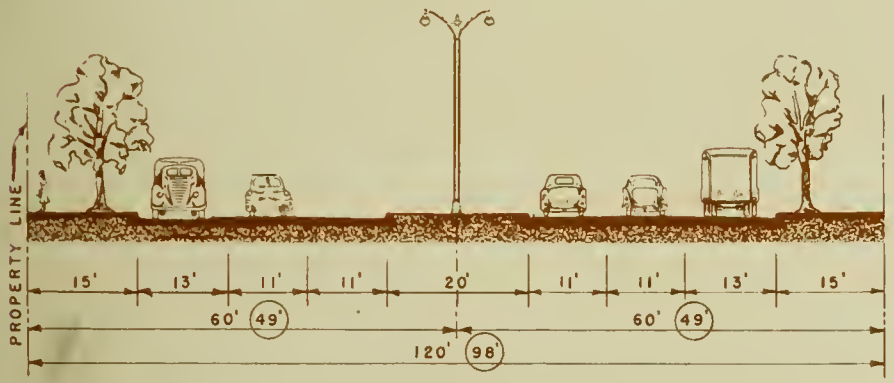
# MAJOR STREETS WITH SIX LANES FOR MOVING TRAFFIC



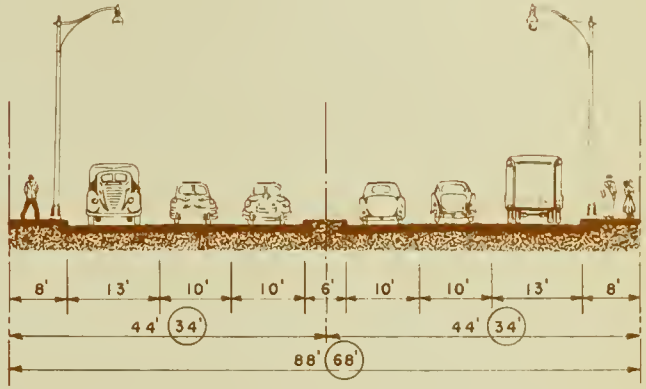

DESIRABLE STANDARD
PARKING PERMITTED




MINIMUM STANDARD
PARKING PERMITTED

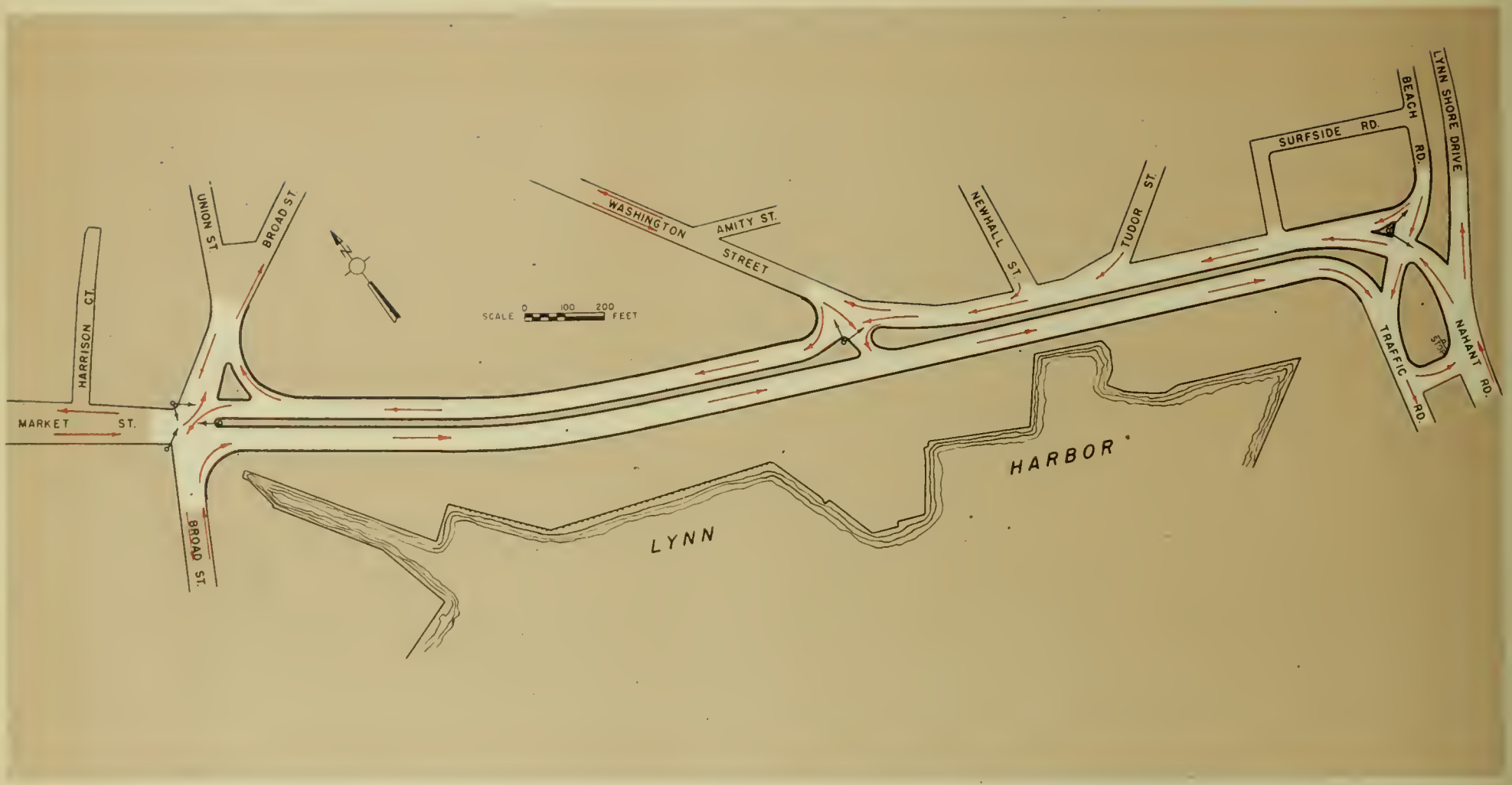



DESIRABLE STANDARD
NO STOPPING IN RUSH HOURS
NO PARKING AT OTHER TIMES




MINIMUM STANDARD
NO STOPPING IN RUSH HOURS
NO PARKING AT OTHER TIMES

CIRCLED NUMBERS INDICATE CORRESPONDING WIDTHS FOR FOUR-LANE STREETS




PROPOSED EXTENSION OF MARKET STREET

LYNN, MASSACHUSETTS

A MODIFICATION OF A PLAN BY FRANK E. GOWDY, CITY ENGINEER

# TRUCK ROUTES

SPECIAL consideration was given to truck movements throughout the metropolitan area in the analysis of the origin and destination data as shown by Plates 6, 9, 10 and 12 in the traffic section of this report. The needs of commercial vehicles have influenced the selection of expressway routes as well as the development of a system of arterial streets. Provisions have been made in locating access ramps on the expressways, and in the development of other plans, for the movement of trucks to and from present and proposed truck terminals, market areas, freight terminals and piers.

It is recommended that trucks be permitted to operate on every section of the proposed system of expressways. In establishing priorities for the construction of these expressways, a high rating was assigned to the Southwest Expressway because of the totally inadequate highway facilities which are now available to commercial vehicles traveling in this general direction.

Many suggestions were made to the consultants for their consideration in planning better facilities for the heavy flow of truck traffic across Charles Street between Longfellow Bridge and Park Square. Most of these ideas involved relatively costly construction. It is felt, however, that the comprehensive program of other improvements recommended herein for the downtown area will make it unnecessary to perform extensive work in the vicinity of Charles Street itself.

The extension of Embankment Road and its connection with the four one-way streets previously described should attract almost two-thirds of the automobiles now using Charles Street, according to traffic analyses. Similarly, at least one-half of the trucks now using Charles Street will prefer to use the Central Artery, other sections of the Belt Route, or the widened surface streets after those projects are completed.

In the meantime, Charles Street should remain a two-way artery for mixed traffic. Parking should continue to be prohibited between 8:00 a.m. and 10:00 a.m. and from 4:00 p.m. to 6:00 p.m. and this "all-rolling" regulation should be rigidly enforced.

Truck traffic should also be permitted on Old Colony Parkway as far south as Gallivan Boulevard until such time as the Southeast Expressway can be constructed. Improvements to Old Colony Parkway to fit it for this type of traffic can readily be made.

Preliminary location studies have been made by various agencies for a highway along Gravelly Creek between Mystic Avenue at Brooks Park and the Fellsway West near Fulton Street. This would provide an attractive route for trucks around the section of the Fellsway from which commercial vehicles are now excluded, and at the same time would furnish a by-pass route for badly congested Medford Square. This improvement is also indicated on the Master Plan Map.

# PARKING RECOMMENDATIONS

THE RECOMMENDED EXPRESSWAYS WILL SERVE THEIR intended function only if they are supplemented by adequate storage facilities to receive the vehicles as they arrive in the downtown area.

The City Planning Board of Boston has recently completed a study of the economics of proposed new off-street parking facilities in Downtown Boston. This study is being used to guide the expenditure of a fund of $5,000,000 to secure sites and build parking garages which will then be leased to private operators. The studies indicate that unless substantial subsidies are furnished by governmental agencies, parking rates will range from forty cents to seventy-five cents for all-day parking. Your consultants confirm these estimates by recent studies they have made. The higher figure will prevail in most instances in Boston because of the high value of downtown property.

Motorists now parking on the streets of Downtown Boston would unquestionably be put to considerable out-of-pocket expense if curb parking privileges were suspended. Much, much greater, however, are the hidden costs to their fellow motorists and themselves, as well as the costs to the community at large, under the present intolerable congestion caused by curb parking, much of it in flagrant violation of parking regulations. Even a reasonably satisfactory solution of traffic conditions in this area will require almost complete prohibition of curb parking together with strict enforcement.

That this regulation will be a benefit, rather than a hardship, both to motorists and to downtown business establishments, is illustrated by the experience in Chicago. Complete prohibition of curb parking in the "Loop" on January 10, 1928, resulted in a 32.6 per cent *increase* in the number of automobiles accumulated in the downtown district at 2:30 P.M. on comparable weekdays before and after the restrictions went into effect. Motorists found that the ease and safety of movement within the area more than compensated them for the cost of parking in the lots and garages which appeared quickly under private initiative shortly after the curb parking ban became effective.

The first of the new garage sites selected by the City Planning Board are close to the proposed route of the Central Artery. This policy should also be followed in selecting a number of additional sites. Other garages can appropriately be located along Cambridge, Portland, Sudbury and other streets which are or will be widened. In this way, traffic on the narrow streets can be kept to a minimum.

The parking report prepared by the City Planning Board pointed out that there is a dearth of factual information on the parking habits of motorists driving to Downtown Boston. Your

consultants urge that a comprehensive parking survey be made as a sound basis for expansion of the initial program for development of parking facilities. It will be imperative to have a broad concept of the size of the task so that plans will be neither grossly inadequate nor overly ambitious.

On many of the arterial streets designated herein, parking will have to be prohibited in certain sections and at certain times to permit the street system to work efficiently. Detailed traffic surveys will be required before specific recommendations as to these regulations can be prepared for the several hundred miles of streets involved. Administrative agencies in the various communities have demonstrated their understanding of the problem and the proper use of parking control techniques. There has been little opportunity in the recent hectic years to restore regulation and enforcement to the high standards required to move the great masses of traffic found in the Boston Metropolitan Area. Many of the cities and towns in the region, in addition to Boston, will find it to their advantage to make complete parking surveys and prepare long-range plans for providing off-street facilities in their central business districts.

There is an obvious need for a strong, well conceived program to aid the police in the enforcement of parking regulations. This is true not only in Boston but in essentially all of the surrounding cities and towns. No single measure will fulfill the need. More officers should be assigned to the parking phase of traffic regulations, fines should be severe enough to deter repeaters and flagrant violators, and special parking privileges nullifying restrictions should not be tolerated. Property values have declined to the extent of millions of dollars in recent years and much of this loss can be traced to traffic congestion. A large part of the congestion is caused by illegal parking and, viewed in this light, the seriousness of the acts of parking violators is clearly apparent.

# COORDINATION WITH TRANSIT IMPROVEMENTS

A COMPREHENSIVE PLAN FOR IMPROVEMENT OF THE transit system is contained in the two reports by the Metropolitan Transit Recess Commission dated April, 1945, and April, 1947. It is assumed that this program, in essentially the form and to the extent recommended, will be carried out. If rapid transit facilities are not extended and improved, the system of expressways recommended will be inadequate to handle the volumes of traffic that will be generated in the outer and rapidly growing portions of the metropolitan district.

The expressways do not offer a rubber-tired alternate to railborne rapid transit. The vast number of people to be handled by public transportation would make such an expedient economically unsound. Furthermore, the downtown street system would be unable to absorb any significant portion of the number of buses that would be involved.

It is recommended that express buses be operated from Chelsea to downtown Boston over the Mystic River Bridge and the Central Artery to an off-street bus terminal. Further study should be given to the need for express bus operation along the Southeast Expressway to supplement the Washington Street rapid transit subway when use of this latter facility is materially increased by proposed rail rapid transit extensions into areas now served by suburban railroads.

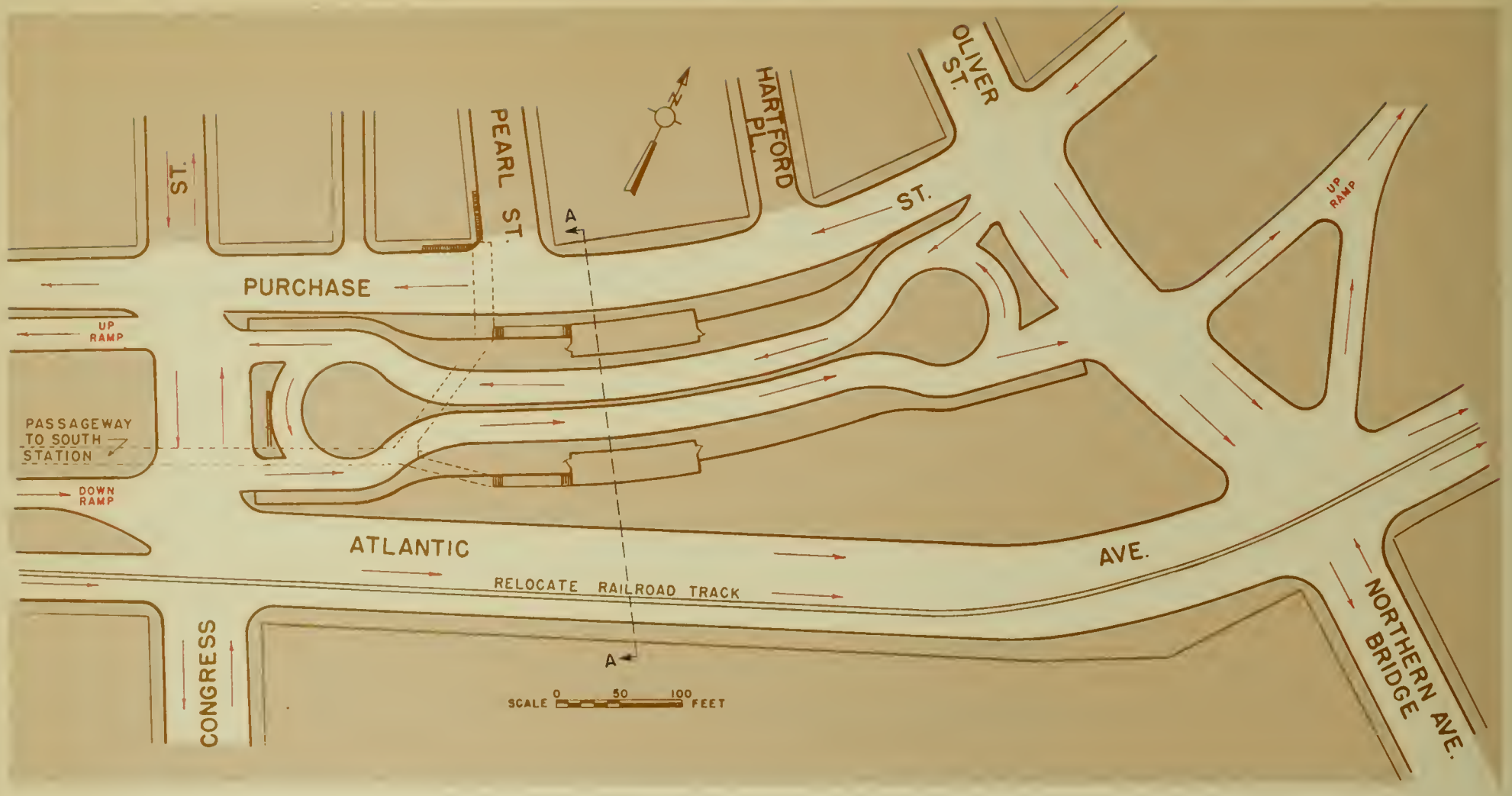
It is contemplated that essentially all inter-city buses will enter downtown Boston over the Central Artery. They will be accommodated, under the expressway plan, in a new bus terminal which will be constructed under the elevated highway in the section along Atlantic Avenue between Congress and Oliver Streets. This terminal will be approached from either the north or the south with only minor use of surface streets and will have adequate capacity for anticipated bus traffic. A plan and elevation of the proposed terminal is shown herewith. This station will be connected through an underground passageway with the South Station.

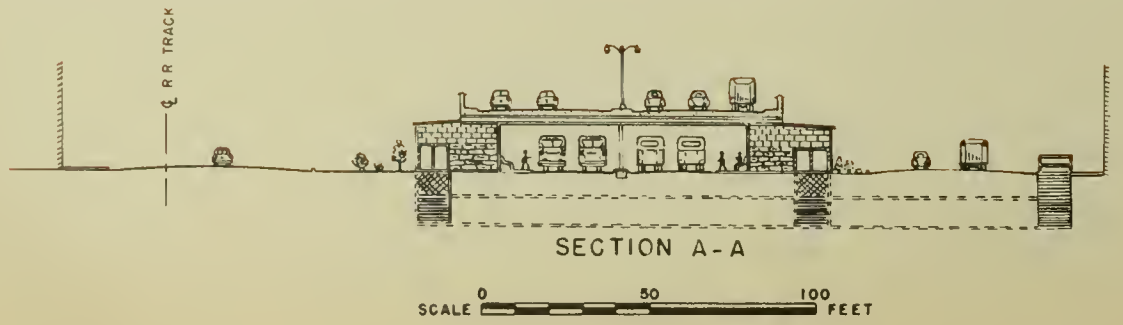
It is also proposed that a bus station be provided on the Central Artery in the vicinity of Haymarket Square which will serve both transit and inter-city buses to and from the north. This station would connect by underground passageways with

both the Union-Friend and the Haymarket Square stations of the Metropolitan Transit Authority system.

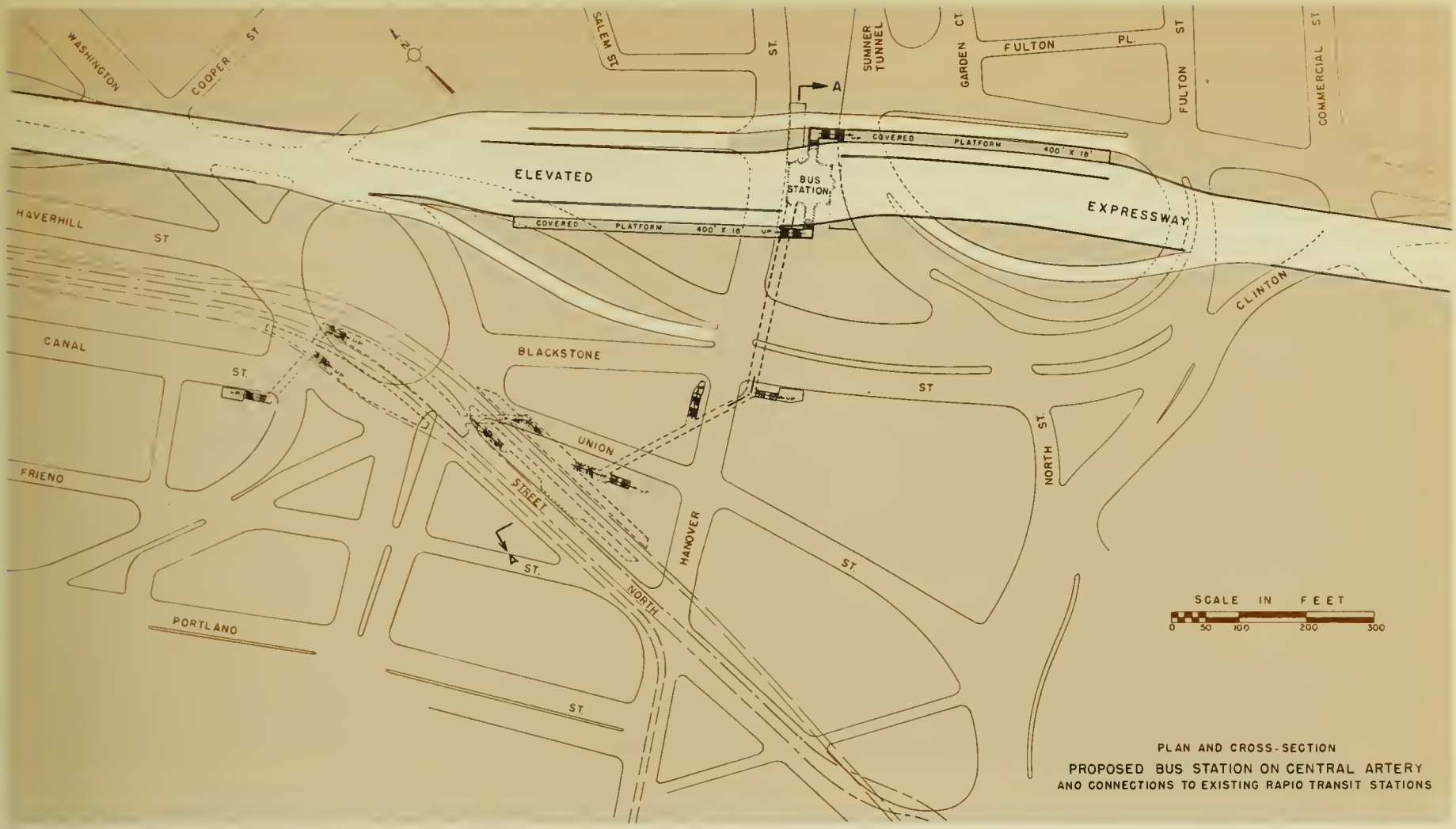
Tentative proposals have been made by the Metropolitan Transit Authority for a bus terminal in the South Station if and when a large portion of the suburban railroad service now operated by the New Haven Railroad is discontinued. Whether this bus station or the one under the Central Artery is the one to be built will depend largely on the sequence of events in carrying out both the transit and highway programs. Either station would be a vast improvement over the existing inadequate terminals provided for inter-city bus passengers.

Studies are being continued by the Metropolitan Transit Authority of opportunities to consolidate rights-of-way for both highway and rail rapid transit functions. One or two interesting possibilities have developed and are being investigated further. If such consolidation can be effected to any substantial degree, major economies will follow.



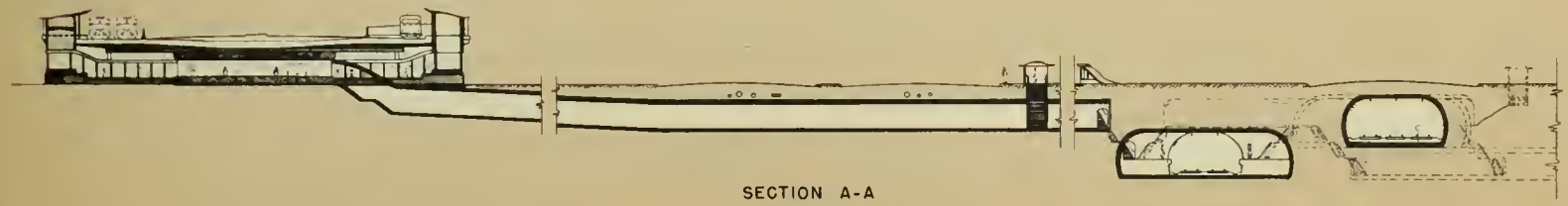




PROPOSED BUS TERMINAL
UNDER CENTRAL ARTERY
NEAR SOUTH STATION




PLAN AND CROSS-SECTION

PROPOSED BUS STATION ON CENTRAL ARTERY
AND CONNECTIONS TO EXISTING RAPID TRANSIT STATIONS



SECTION A-A

SCALE 0 10 20 40 60 FEET

# ESTIMATES OF COST

THE TOTAL COST FOR EACH OF THE PROJECTS REPORTED on herein is shown on the attached tabulation, and a breakdown of the total cost for each expressway section is given in Appendix B. Project costs include items for preliminary work; construction cost and contingencies; engineering; demolition and moving of buildings; changes and relocation of utilities; legal, administrative and overhead costs; maintenance of traffic; and assessed valuations of right-of-way plus engineering, legal and administrative costs in connection with property acquisition. A lump sum item is included in the tabulation to cover total project costs for all of the work proposed under the section "Major Street System."

## PRELIMINARY COSTS

Preliminary expenses include those generally incurred on large projects prior to the preparation of contract plans and specifications. Items of work normally included under this heading are special reports and studies, preliminary locations and estimates, borings and other sub-surface investigations, additional traffic studies, et cetera. This item is estimated at one percent of the construction costs.

## CONSTRUCTION COSTS

Construction costs are based upon the design standards described heretofore which have been incorporated in each of the expressway projects to provide facilities of adequate capacity to safely and efficiently handle the predicted volumes of mixed traffic. These costs for the various expressways and for all items included in the street improvement program are based upon an analysis of conditions at each site, study of availability of local materials, current bid prices and contractors and suppliers costs on work of similar character. On certain items prices have been fixed after consultation with local contractors experienced on projects of the type involved.

An item amounting to ten percent of the estimated construction cost has been added to each of the projects to cover contingencies.

## ENGINEERING COSTS

Engineering costs include items for preliminary and detailed surveys, the preparation of complete construction plans, specifications and contract documents, general supervision of construction, detailed inspection of materials and workmanship, bid analysis and contract awards, preparation of construction estimates and the coordination of all construction and material contracts. This item is figured at ten percent of the construction costs.

## DEMOLITION AND MOVING OF BUILDINGS

In the matter of the demolition or relocation of existing

buildings, experience on similar highway projects has proven that separate contracts should be let for such purposes prior to the inauguration of actual construction contracts in order that the latter contractors will not be impeded or delayed in the prosecution of their work and have a clear site available throughout the entire length of each project. In some instances sites are available adjacent to the project where existing houses can be moved a few hundred feet and placed on new foundations. In other locations, buildings may be considered of such low value that it will be found more economical to demolish them entirely.

The item of "Demolition and Moving of Buildings" as included herein is based upon prices prevailing.

In view of the fact that there may be a time lapse prior to the start of actual construction and it may be found necessary to fill existing cellars under buildings which have been razed or moved, cost of this item of work has been included herein.

## CHANGES AND RELOCATION OF UTILITIES

A number of utilities will be encountered during construction of the various projects. These include sanitary and storm sewers, municipal and metropolitan water supply systems, mass transportation facilities, gas mains, overhead and underground electric systems, telephone and telegraph lines and railroads.

In most instances, expressways have been so located as to minimize the amount of interference with the above-named utilities but, in certain locations, extensive changes cannot be avoided. The estimates presented herein include ample allowances for such changes based upon a study of existing plans and field reconnaissance in each instance.

## LEGAL, ADMINISTRATIVE AND OVERHEAD

Legal, administrative and overhead costs include a pro-rata amount of costs, not included herein but which would be incurred by the Department of Public Works in connection with contractual matters and general expenses of a similar nature involving expenditures of funds on projects of this magnitude.

## MAINTENANCE OF TRAFFIC

In order to maintain traffic on existing highways, transit and railroad lines, special consideration must be given to coordinating the construction program. It has been found in other instances that detailed plans for this item must be worked out well in advance because of the length of time the particular facility may be affected.

The estimate for this item therefore includes such facilities as temporary bridges and signs, special lights, temporary roadways, leasing of rights-of-way, et cetera, and is based upon the cost of work of a similar character performed in other localities.

## RIGHT-OF-WAY COSTS

Right-of-way costs in the Metropolitan Area form a large part of the total project cost and these will vary according to the character of the properties traversed. In estimating these costs a field survey of each route was made and assessment records were secured in each of the towns and cities affected.

The estimates of right-of-way costs are based upon currently assessed valuations for both land and buildings.

Costs incidental to the acquisition of right-of-way include engineering, legal and administrative costs. These items cover the preparation of surveys, property plats, appraisals, searching of records, court costs, moving of tenants and other expenses and amount to 15 percent of the assessed values.

## ESTIMATES OF COST

| *Expressway Section* | *Mileage* | *Construction* | *Rights of Way (Assessed Valuations)* | *Total* | |
|---|---|---|---|---|---|
| Southeast Expressway | 11.8 | $ 21,800,000 | $ 6,200,000 | $ 28,000,000 | |
| Southwest Expressway | 11.4 | 17,700,000 | 5,900,000 | 23,600,000 | |
| Worcester Turnpike | 3.7 | 5,400,000 | 3,200,000 | 8,600,000 | |
| Western Expressway | 7.7 | 15,400,000 | 2,900,000 | 18,300,000 | |
| Northwest Expressway | 12.1 | 17,700,000 | 5,400,000 | 23,100,000 | |
| Northern Expressway | 12.5 | 21,800,000 | 5,600,000 | 27,400,000 | |
| Northeast Expressway | 13.0* | 14,200,000 | 5,700,000 | 19,900,000 | |
| East Boston Expressway | 2.5 | 24,400,000 | 1,600,000 | 26,000,000 | |
| Belt Expressway, including Central Artery | 10.7 | 72,500,000 | 31,000,000 | 103,500,000 | |
| Sub Totals | 85.4 | $210,900,000 | $67,500,000 | $278,400,000 | |
| Embankment Road | 2.0 | | | 6,200,000 | |
| TOTALS | 87.4 | | | | $284,600,000 |
| Proposed Improvements to Existing Highways | | 26,000,000 | 11,400,000 | | 37,400,000 |
| GRAND TOTAL | | | | | $322,000,000 |

NOTE: Expressway mileages are measured to center of Belt Expressway Interchanges.

*Mileage includes New Mystic River Bridge.

Construction Costs include Preliminary Costs; Engineering; Demolition; Changes in Utilities; Maintenance of Traffic and Contingencies.

Right of Way Estimates are based upon current assessment valuations and include an item for acquisition costs.

# ECONOMIC JUSTIFICATION FOR EXPRESSWAY SYSTEM

THE CONSTRUCTION OF ANY NEW HIGHWAY FACILITY for the use of the public, such as the proposed system of expressways for the Boston Metropolitan Area, should be justified by a study of benefits weighed against costs. Such a study has been made on the basis of assumptions comparable to those which have proved sound under the rather rigid financing requirements for revenue producing facilities. These studies indicate that the proposed expressway system would be a good investment for the motorists and other taxpayers of the metropolitan area and that for this reason, as well as for all the social benefits anticipated, the project should be approved and built.

Several studies were available to the consultants on average speeds of vehicle operation in various parts of the metropolitan area under present conditions. These speeds vary from an average of 3 miles per hour in sections of downtown Boston to 30 miles per hour on outlying highways. Since the greater portion of traffic operates in areas where speeds are low, it is estimated that weighted average speeds for all motor vehicle travel are between 15 and 20 miles per hour. Average speeds of 35 to 40 miles per hour would prevail on the proposed expressways. Time savings, therefore, would be approximately 1.5 minutes per mile.

The value of a motorist's time has been debated for a number of years without arriving at a generally accepted figure. Actually, the amount a motorist or a truck operator is willing to pay for the use of a superior facility depends not alone on potential time savings but also on the extent to which relief is afforded from accident hazards, possibilities of major delays, and the irritations of pedestrians, traffic signals, turning vehicles, and all the other vexations typical of surface streets. A report entitled "Toll Roads and Free Roads" published by the Bureau of Public Roads in 1939 estimated that a toll of approximately 1¢ per mile for automobiles and 3.5¢ per mile for trucks, which would produce a weighted average toll of 1.5¢ per vehicle-mile, would develop maximum revenues on a toll road. Inflationary trends since 1939 would make a comparable figure for 1947 at least 2.0¢ per vehicle-mile. At expressway speeds, this would be equivalent to about 1.25¢ per vehicle-minute. Time savings averaging 9 or 10 minutes would be realized by motorists using expressways in the Boston Metropolitan Area.

The traffic in 1970, for which the expressways have been designed, has been estimated at approximately 275,000,000 individual trips averaging 3.2 miles each or 880,000,000 vehicle-miles annually. At an assumed benefit of 2.0¢ per vehicle-mile for the average vehicle, the proposed system would create a public benefit equal to approximately $17,600,000 per year. If this benefit were capitalized at 3 percent interest over a period of 30 years, it would justify a capital expenditure of over $345,000,000. The total cost of the recommended expressway has been estimated at $284,600,000 for construction and right-of-way.

Public benefits of 2.0¢ per vehicle-mile, therefore, would exceed in total value the amount necessary for annual interest payments and retirement of principal, if the undertaking were to be viewed purely on a business basis.

It is estimated that there will be 75,000,000 vehicle-miles of travel annually by 1970 on the Central Artery alone between Massachusetts Avenue and the interchange north of the Charles River. It is also estimated that this traffic will move at an average speed of 30 miles per hour, rather than the present speed for vehicular trips in downtown Boston of less than 10 miles per hour, so that the average saving will be at least 4 minutes per mile. If the value of a motorist's and truck driver's time is taken at the conservative figure of 1.25¢ per minute, the annual saving on the Central Artery in 1970 would be $3,750,000. This economic benefit, capitalized at 3 per cent over a period of 30 years, would justify an expenditure of approximately $73,500,000. The estimated cost of this same section of expressway, including construction and right-of-way, has been estimated at $59,500,000. The Central Artery as a terminal facility, therefore, would have to be partly justified by its indispensability to the balance of the expressway routes. This is typical of all types of transportation systems, and the Central Artery comes closer to being economically justified as a unit than most terminal facilities.

Maintenance and operating costs on the proposed expressway system would be more than offset by an equitable allotment of funds received by the Commonwealth from users of the expressway in the form of gasoline taxes, vehicle registration fees and other regular sources of highway revenue.

While the direct dollar benefits as estimated in this way prove that the expressways are justified, there are other benefits of perhaps even greater significance which would have just as real economic value but which cannot be so readily estimated. There are also social benefits which cannot be reduced to dollar value. Among these benefits is the assurance that traffic accidents would drop to a fraction of the rate on surface streets because the nature of expressways makes many of the most serious types of accidents physically impossible. Furthermore, if the expressways are not built, many expensive expedients such as street widening, traffic officer control, parking prohibitions (compensated for by costly off-street parking facilities and truck loading docks), and other substitutes will have to be applied more broadly than otherwise. The experience in other cities indicates that these steps alone do not satisfy the need for modern traffic arteries. Another major consideration is the improved service to inter-city passengers that would be furnished by operation of buses on the new highways. Finally, and perhaps of the greatest economic value, the expressways will protect and enhance property values throughout the metropolitan area and particularly in the central business district. The prosperity and welfare of every modern community depends on the expeditious movement of people and goods.

While it is difficult to compute the exact value of the many benefits that will accrue to the community and its citizens as a result of the construction of the proposed system of expressways, it can easily be seen that the benefits will far exceed even the substantial cost involved.

# CONSTRUCTION PROCEDURE

The scheduling of a construction program of the magnitude presented herein requires the coordination of financial planning, labor and material supplies, legal procedure, traffic demands and other controlling factors in order that the work may be prosecuted smoothly in stages consistent with the Commonwealth's desire and ability to finance such a program.

The traffic analysis indicates volumes sufficient to require the construction of the major portion of this program immediately. It is not within the province of this report to determine the amount of funds which can be made available from year to year to finance the recommended program and, therefore, a schedule has been set up to provide for the construction of usable sections thereof, according to the relative urgency of the needs of the various areas to be served.

A study of the entire program indicates that a maximum of five stages or divisions of work should be planned. Each stage includes construction of portions of three or more expressway projects. Thus, work can be in progress simultaneously in widely separated sections of the metropolitan area, minimizing interference with existing traffic and other services.

An accompanying plate indicates by color which portions of the expressway projects are recommended for construction in each of the five stages.

Recommended improvements to existing streets and street intersections should be accomplished as rapidly as the necessary funds become available. Since improvements in each location are urgently needed and work on each can be conducted independently, this part of the program can be completed without interference with the expressway construction plan. Priorities have not been established for this work.

In setting up a stage construction or priority program, it must be recognized that the building of an expressway project in sections may impose conditions upon the existing street system tending to cause further congestion. In other words, the first unit of an individual expressway will not serve as an efficient artery by itself unless each unit is of sufficient length and provided with connections to the existing street system in order that it may attract and distribute sufficient traffic in the proper manner. It is paramount, therefore, to insure the completion of an entire individual expressway prior to embarking on the construction of a single section which by itself may be ineffective. In setting up the stages described hereinafter, limitations imposed by financial considerations, rights-of-way, engineering, construction and planning have been coordinated with the above traffic factors in order to insure a high degree of utility.

## STAGE NO. 1

a. Downtown Boston is the scene of the greatest traffic con-

gestion. The approach to the Sumner Tunnel is a typical example. The Central Artery as previously described, will offer immediate relief to this area and, therefore, this section of the Belt Route should be considered as the starting point for the entire expressway system in establishing a policy of building outward from the center of the city. Should the outer ends of the various expressways be constructed first, traffic would be collected and deposited at so-called "dead end" points where sufficient streets would not be available to carry this traffic. The Central Artery section involves the largest expenditure per mile and considerable time to construct primarily because of right-of-way conditions. In order that its capacity may be utilized to the fullest extent, it should be connected to the Mystic River Bridge as shown on Exhibit 24. At its southern end, it should be connected via the Massachusetts Avenue interchange with the Old Colony Parkway. A complete north-south facility would thus be formed to serve the downtown area. Traffic from the Sumner Tunnel will have access to this facility thereby relieving congestion on the Boston approach to this Tunnel. The interchange at Massachusetts Avenue will connect to surface streets for serving the Roxbury area.

b. It is recommended that the Embankment Road project be included in the first construction stage. This facility has been proposed by the Metropolitan District Commission. This project can be constructed in a very short time and will furnish some measure of relief to Commonwealth Avenue and Beacon Street until such time as the entire Belt Expressway can be completed.

c. Funds are available and plans have been completed for constructing the East Boston Elevated Highway approach to the Sumner Tunnel. As part of the East Boston Expressway, it is logical for this project to be placed in Stage No. 1. Its construction will furnish immediate relief to Tunnel traffic at the East Boston Plaza.

**STAGE NO. 2**

The southwest and northwest sections of the Metropolitan area suffer from lack of adequate traffic arteries approaching the center of the City. It is, therefore, recommended that projects should be included in this stage which will provide relief to these areas.

a. It is recommended that a short section of the Southwest Expressway be included in this stage to connect the Expressway Belt to Blue Hill Avenue in the vicinity of Washington and Seaver Streets. In this manner a new facility will be provided for truck traffic to relieve the congested section of Blue Hill Avenue between Washington Street and Massachusetts Avenue.

b. The heaviest flow of traffic as indicated by the desire lines is in the western section now served by the Worcester Turnpike and Commonwealth Avenue. It is, therefore, important that these routes be improved at an early date in order that they will efficiently carry traffic until such time as the Western Expressway can be completed. It is recommended that improvements to State Route 9, the Worcester Turnpike, from the Jamaicaway to Hammond Pond Parkway be included in this stage.

c. & d. Traffic to the northwest presently moves to the downtown area via Commonwealth Avenue, Beacon Street and the boulevards on either side of the Charles River. Traffic from this area should be provided with its own artery because of the heavy volume desiring to move through the Cambridge-Somerville district. It is recommended that a section of the Northwest Expressway and the Expressway Belt be included in this stage to connect the Central Artery and the Mystic River Bridge to the Concord Turnpike and Massachusetts Avenue at the Alewife Brook Parkway. In this manner, an artery will also be provided for east-west traffic moving between Charlestown and the Mystic River Bridge to Cambridge and the west. Complete facilities will thus be afforded for traffic moving from the southeast via the Old Colony Parkway and the Sumner Tunnel to the Concord Turnpike and Route 3 to the northwest.

e. In order to further improve the connections at the northeast, it is recommended that a portion of the Northeast Express-

# CONSTRUCTION STAGES

way connecting the Mystic River Bridge with Squire Road and U. S. Route 1 and State Route 107 to Lynn be included in this stage, thus providing immediate relief to the Sumner Tunnel.

## STAGE NO. 3

a. In logical order the remainder of the Belt Route should next be completed from the interchange at Massachusetts Avenue and Southampton Street to the Northwest Expressway connection. Thus, all of the radial expressways except the Western will be connected to the Belt Route at an early date whereby effective relief can be provided in the distribution of traffic throughout the entire downtown Boston area. Complete routes will automatically be available for crosstown and by-passable movements around the Central Area.

b. The remainder of the Southwest Expressway connecting with U. S. Route 1 should be included in this stage resulting in relief for the heavy truck traffic now forced to use Washington Street.

c. At this stage, no doubt, traffic to East Boston will have increased to a point where the construction of the second Sumner Tunnel will be required. It has, therefore, been included in this group.

## STAGE NO. 4

a. Under prior stages traffic to the southeast would be served by the Old Colony Parkway. It is recommended that the Southeast Expressway be continued under this stage from Gallivan Boulevard to its southern terminus to connect with State Routes 3 and 18, in order to remove by-passable traffic from the business section of Quincy, particularly during the summer season.

b. Next in priority should come the first section of the Western Expressway to connect the Belt Route with the Newton-Watertown area in the vicinity of Galen Street.

c. Traffic presently passing through Stoneham from Route 28 encounters serious congestion in this town. It is recommended that the first section of the Northern Expressway to be built under this stage should include a by-pass of Stoneham from the Fellsway route near Spot Pond to North Street in Reading.

d. The second section of the Northern Expressway recommended for inclusion in this stage, involves reconstruction of the Northern Artery from Nashua Street to the Revere Beach Parkway. In this manner, an efficient expressway will be provided from downtown Boston via the Fellsway West to Reading.

e. The short connection between State Route 107 and State Route 1-A at Revere Beach on the Northeast Expressway is included herein.

## STAGE NO. 5

Under this stage the remainder of the various expressways are included as follows:

a. Southeast Expressway from Columbia Circle to Gallivan Boulevard, to replace the Old Colony Parkway which had been used as part of the Southeast Expressway under Stage No. 1.

b. The Western Expressway from Galen Street to its western terminus at Commonwealth Avenue where a connection can be provided for an extension to meet U. S. Route 20 should this highway be completed by the time the Western Expressway is extended.

c. The Northwest Expressway between Massachusetts Avenue through Winchester to connect with U. S. Route 3 and via the Woburn by-pass to connect with State Route 38.

d. The Northern Expressway from the Revere Beach Parkway to the Stoneham by-pass.

e. The improvement to U. S. Route 1, the Newburyport Turnpike, has been deferred until this point, however, it is recommended that it be included in Stage No. 5 to complete the entire Northeast Expressway.

The attached tabulation shows a breakdown of stage construction costs for the entire expressway system.

# ESTIMATE OF EXPRESSWAY STAGE CONSTRUCTION COSTS

| Stage | Project | Section Cost | Project Cost | Stage Cost |
|---|---|---|---|---|
| 1 | a. Expressway Belt — Mystic River Bridge connection via Central Artery to Southeast and Southwest Expressway Interchange | $59,500,000 | | |
| | Northeast Expressway — Connection and Revisions to South End of Mystic River Bridge | 3,390,000 | | |
| | Southeast Expressway — Expressway Belt to Old Colony Boulevard | 4,400,000 | | |
| | | | $67,290,000 | |
| 1 | b. Embankment Road — Charles Street to Bay State Road | | 6,200,000 | |
| 1 | c. East Boston Expressway — East Boston Elevated Highway | | 8,440,000 | |
| | TOTAL STAGE 1 | | | $81,930,000 |
| 2 | a. Southwest Expressway — Expressway Belt to Washington Street and Blue Hill Avenue | | 6,200,000 | |
| 2 | b. State Route 9, Worcester Turnpike — Expressway Belt to Sumner Road and Warren Street | 5,920,000 | | |
| | Improvements to Route 9—Sumner Road to Hammond Pond Parkway | 2,680,000 | | |
| | | | 8,600,000 | |
| 2 | c. Expressway Belt — Northwest Expressway Interchange to Mystic River Bridge Connection | | 16,650,000 | |
| 2 | d. Northwest Expressway — Expressway Belt to Concord Turnpike Connection | 7,230,000 | | |
| | Concord Turnpike Connection to Massachusetts Avenue at Alewife Brook Parkway | 1,330,000 | | |
| | Concord Turnpike Connection | 1,750,000 | | |
| | | | 10,310,000 | |
| 2 | e. Northeast Expressway — Connection and Revisions to North End of Mystic River Bridge | 1,360,000 | | |
| | Mystic River Bridge to 'Y' Interchange — Revere | 6,010,000 | | |
| | 'Y' Interchange — Revere to Cutler Highway and Squire Road | 1,340,000 | | |
| | 'Y' Interchange — Revere to Broadway, Route 107 | 1,690,000 | | |
| | | | 10,400,000 | |
| | TOTAL STAGE 2 | | | $52,160,000 |

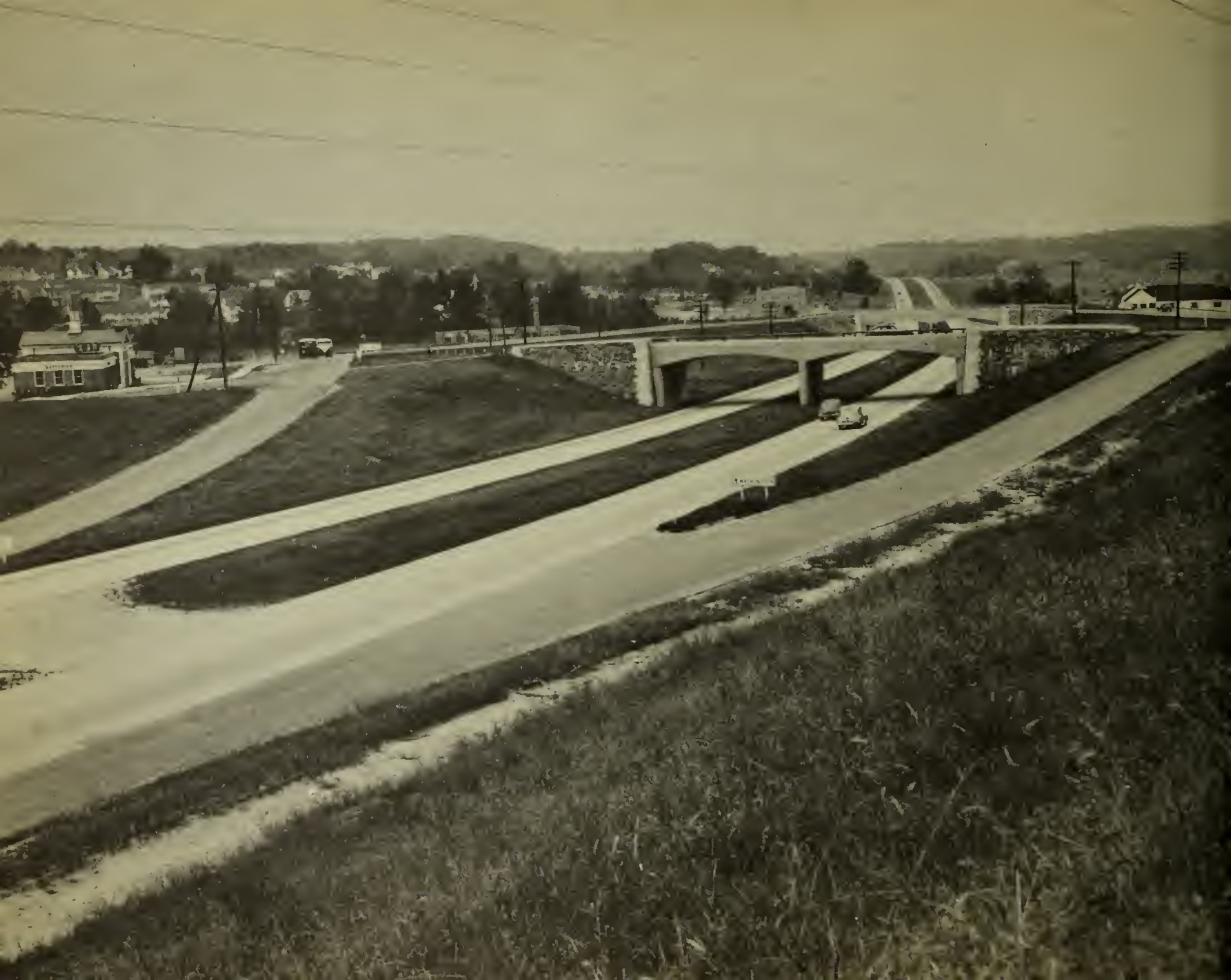
# ESTIMATE OF EXPRESSWAY STAGE CONSTRUCTION COSTS

| Stage | Project | Section Cost | Project Cost | Stage Cost | Total Cost |
|---|---|---|---|---|---|
| 3 | a. Expressway Belt — Southeast and Southwest Expressway Interchange to Northwest Expressway Interchange | | $27,350,000 | | |
| 3 | b. Southwest Expressway — Washington Street and Blue Hill Avenue to Neponset Parkway Connection | $ 5,050,000 | | | |
| | Neponset Parkway Connection | 1,650,000 | | | |
| | Neponset Parkway Connection to U. S. Route 1 | 10,700,000 | | | |
| | | | 17,400,000 | | |
| 3 | c. East Boston Expressway — Proposed Tunnel | | 17,560,000 | | |
| | TOTAL STAGE 3 | | | $62,310,000 | |
| 4 | a. Southeast Expressway — Gallivan Boulevard to Routes 3 and 18 | | 16,880,000 | | |
| 4 | b. Western Expressway — Expressway Belt to Galen Street | | 9,700,000 | | |
| 4 | c. Northern Expressway — Stoneham By-Pass — Fellsway West to North Street, Reading | | 6,150,000 | | |
| 4 | d. Northern Expressway — Nashua Street to Revere Beach Parkway | | 7,960,000 | | |
| 4 | e. Northeast Expressway — Broadway, Route 107, to Route 1A | | 880,000 | | |
| | TOTAL STAGE 4 | | | $41,570,000 | |
| 5 | a. Southeast Expressway — Old Colony Boulevard to Gallivan Boulevard | | 6,720,000 | | |
| 5 | b. Western Expressway— Galen Street to Commonwealth Avenue, Route 30 | | 8,600,000 | | |
| 5 | c. Northwest Expressway— Massachusetts Avenue at Alewife Brook Parkway to Bacon Street, Winchester | 4,980,000 | | | |
| | Bacon Street, Winchester to U. S. Route 3 | 5,250,000 | | | |
| | Woburn By-pass Connection to Route 38 | 2,560,000 | | | |
| | | | 12,790,000 | | |
| 5 | d. Northern Expressway — Revere Beach Parkway to Main Street, Melrose | 9,890,000 | | | |
| | Main Street, Melrose to Stoneham By-pass | 3,400,000 | | | |
| | | | 13,290,000 | | |
| 5 | e. Northeast Expressway — Improvements to U. S. Route 1 — Squire Road to Route 128 | | 5,230,000 | | |
| | TOTAL STAGE 5 | | | $46,630,000 | |
| | GRAND TOTAL — ALL STAGES | | | | $284,600,000 |

IN conclusion, your Joint Board can take pride in having inspired the preparation of a Master Highway Plan for the Boston Metropolitan Area. Realization of the goals envisioned in this plan will require the enthusiastic support not only of the state departments represented on the Board but also of all the agencies at interest in each of the many cities and towns in the metropolitan area. This support should continue, moreover, throughout the extended period that will be required for the legislative, financing and final engineering phases of the program.

An important initial step which should be instituted by State and local officials charged with the responsibility for construction of the expressway system is to enact necessary legislation and proper ordinances to insure control of the rights-of-way for future use.

The potential benefits will be worth the best efforts of all the individuals and all the organizations called upon to serve. Transportation is the key to modern living. The recommended system of expressways and complementary traffic improvements will constitute a transportation betterment of the first magnitude. Benefits in the health, happiness and economic welfare of the citizens of the Commonwealth of Massachusetts will be comparably great.



# APPENDIX A
(APPENDICES 1 to 7)

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# TRAFFIC TABLES

## APPENDIX 1

*Number of Daily Trips by All Types of Motor Vehicles Passing Thru the Study Area from Cordon to Cordon by Station of Entry*

| Station Number | Name of Road | Located in Town of | Passenger Cars & Taxis | Trucks | Total |
|---|---|---|---|---|---|
| 1 | Route 129 | Lynn | 542 | 53 | 595 |
| 2 | Route 1A | Lynn | 365 | 39 | 404 |
| 3 | Essex Street | Lynn | 102 | 27 | 129 |
| 4 | Route 107 | Lynn | 82 | 15 | 97 |
| 5 | Lynn Street | Peabody | 87 | 20 | 107 |
| 6 | Lynnfield Street | Lynn | 138 | 20 | 158 |
| 7 | Route 1 | Saugus | 665 | 101 | 766 |
| 8 | Water Street, Route 129 | Saugus | 80 | 13 | 93 |
| 9 | Main Street | Melrose | 81 | 6 | 87 |
| 10 | Franklin Street | Melrose | 25 | 5 | 30 |
| 11 | Lynn Fells Parkway | Melrose | 92 | | 92 |
| 12 | Woodland Road | Medford | 19 | 3 | 22 |
| 13 | Main Street, Route 28 | Medford | 343 | 47 | 390 |
| 14 | Marble Street | Stoneham | 35 | 4 | 39 |
| 15 | Washington Street | Winchester | 17 | 3 | 20 |
| 16 | Main Street, Route 38 | Winchester | 99 | 22 | 121 |
| 17 | Cambridge Street, Route 3 | Winchester | 163 | 30 | 193 |
| 18 | Summer Street, Route 2A | Arlington | 15 | 1 | 16 |
| 19 | Massachusetts Avenue | Arlington | 107 | 17 | 124 |
| 20 | Concord Pike, Route 2 | Arlington | 155 | 22 | 177 |
| 21 | Route 128 | Waltham | 278 | 60 | 338 |
| 22 | Route 117 | Waltham | 39 | 17 | 56 |
| 23 | Route 20 | Waltham | 214 | 45 | 259 |
| 24 | Route 30 | Newton | 24 | 8 | 32 |
| 25 | Washington Street | Newton | 121 | 18 | 139 |
| 26 | Route 9 | Newton | 431 | 30 | 461 |
| 27 | Central Avenue | Needham | 113 | 13 | 126 |
| 28 | Route 128 | Newton | 210 | 68 | 278 |
| 29 | Great Plain Road | Needham | 12 | 2 | 14 |
| 30 | Dedham Avenue, Route 135 | Needham | 197 | 23 | 220 |
| 31 | High Street, Route 109 | Dedham | 76 | 15 | 91 |
| 32 | Washington Street, Route 1A | Dedham | 170 | 23 | 193 |
| 33 | Providence Pike, Route 1 | Dedham | 623 | 90 | 713 |
| 34 | East Street | Dedham | 7 | 2 | 9 |
| 35 | Route 138 | Milton | 187 | 42 | 229 |
| 36 | Route 128 | Milton | 198 | 8 | 206 |
| 37 | Route 28 | Quincy | 296 | 34 | 330 |
| 38 | North Street | Randolph | 41 | 9 | 50 |
| 39 | Route 37 | Braintree | 171 | 21 | 192 |
| 40 | Route 18 | Weymouth | 205 | 21 | 226 |
| 41 | Union Street | Weymouth | 28 | 6 | 34 |
| 42 | Route 128 | Weymouth | 85 | 4 | 89 |
| 43 | Route 3 | Weymouth | 94 | 9 | 103 |
| 44 | High Street | Weymouth | 27 | 3 | 30 |
| 45 | Fort Hill Street | Hingham | 143 | 10 | 153 |
| 46 | Route 3A | Weymouth | 287 | 41 | 328 |
| 47 | Nahant Road | Nahant | 226 | 20 | 246 |
| | Total | | 7,715 | 1,090 | 8,805 |

## APPENDIX 2

*Number of Daily Trips Crossing Cordon Line and Having Origin or Destination in Study Area by Type of Vehicle and Station*

| Station Number | Name of Road | Located at Boundary of | Passenger Cars & Taxis | Trucks | Total |
|---|---|---|---|---|---|
| 1 | Route 129 | Lynn | 5,691 | 427 | 6,118 |
| 2 | Route 1A | Lynn | 3,480 | 375 | 3,855 |
| 3 | Essex Street | Lynn | 2,064 | 407 | 2,471 |
| 4 | Route 107 | Lynn | 4,246 | 608 | 4,854 |
| 5 | Lynn Street | Peabody | 2,874 | 466 | 3,340 |
| 6 | Lynnfield Street | Lynn | 2,818 | 389 | 3,207 |
| 7 | Route 1 | Saugus | 7,355 | 1,598 | 8,953 |
| 8 | Water Street, Route 129 | Saugus | 1,809 | 206 | 2,015 |
| 9 | Main Street | Melrose | 4,981 | 615 | 5,596 |
| 10 | Franklin Street | Melrose | 1,245 | 324 | 1,569 |
| 11 | Lynn Fells Parkway | Melrose | 3,778 | 13 | 3,791 |
| 12 | Woodland Road | Melrose | 1,408 | 220 | 1,628 |
| 13 | Main Street, Route 28 | Melrose | 8,180 | 997 | 9,177 |
| 14 | Marble Street | Stoneham | 1,827 | 166 | 1,993 |
| 15 | Washington Street | Winchester | 1,607 | 181 | 1,788 |
| 16 | Main Street, Route 38 | Winchester | 3,911 | 983 | 4,894 |
| 17 | Cambridge Street, Route 3 | Winchester | 3,415 | 529 | 3,944 |
| 18 | Summer Street, Route 2A | Arlington | 1,299 | 287 | 1,586 |
| 19 | Massachusetts Avenue | Arlington | 3,287 | 555 | 3,842 |
| 20 | Concord Pike, Route 2 | Arlington | 7,663 | 902 | 8,565 |
| 21 | Route 128 | Waltham | 3,308 | 380 | 3,688 |
| 22 | Route 117 | Waltham | 2,302 | 251 | 2,553 |
| 23 | Route 20 | Waltham | 3,696 | 577 | 4,273 |
| 24 | Route 30 | Newton | 2,769 | 316 | 3,085 |
| 25 | Washington Street | Newton | 5,344 | 1,249 | 6,593 |
| 26 | Route 9 | Newton | 10,325 | 1,150 | 11,475 |
| 27 | Central Avenue | Needham | 1,423 | 198 | 1,621 |
| 28 | Route 128 | Newton | 4,858 | 611 | 5,469 |
| 29 | Great Plain Road | Needham | 1,630 | 152 | 1,782 |
| 30 | Dedham Avenue, Route 135 | Needham | 783 | 95 | 878 |
| 31 | High Street, Route 109 | Dedham | 2,108 | 257 | 2,365 |
| 32 | Washington Street, Route 1A | Dedham | 3,125 | 415 | 3,540 |
| 33 | Providence Pike, Route 1 | Dedham | 4,697 | 958 | 5,655 |
| 34 | East Street | Dedham | 1,330 | 278 | 1,608 |
| 35 | Route 138 | Milton | 5,666 | 1,180 | 6,846 |
| 36 | Route 128 | Milton | 1,962 | 88 | 2,050 |
| 37 | Route 28 | Quincy | 4,724 | 515 | 5,239 |
| 38 | North Street | Randolph | 2,003 | 582 | 2,585 |
| 39 | Route 37 | Braintree | 2,097 | 377 | 2,474 |
| 40 | Route 18 | Weymouth | 2,356 | 397 | 2,753 |
| 41 | Union Street | Weymouth | 1,942 | 208 | 2,150 |
| 42 | Route 128 | Weymouth | 1,007 | 96 | 1,103 |
| 43 | Route 3 | Weymouth | 2,182 | 171 | 2,353 |
| 44 | High Street | Weymouth | 1,319 | 167 | 1,486 |
| 45 | Fort Hill Street | Hingham | 1,087 | 160 | 1,247 |
| 46 | Route 3A | Weymouth | 5,879 | 699 | 6,578 |
| 47 | Nahant Road | Nahant | 2,023 | 185 | 2,208 |
| | Total | | 154,883 | 21,960 | 176,843 |

## APPENDIX 3

*Inter- and Intra-Zone Trips by Type of Vehicle for Zones of the Downtown Area and All Other Zones*

| Movement | Passenger Cars & Taxis | Trucks | Total |
|---|---|---|---|
| Inter- and Intra-Zone Trips Between Downtown Area and Other Zones | 117,968 | 43,682 | 161,650 |
| Inter- and Intra-Zone Trips Between Zones Exclusive of Downtown Area | 349,180 | 114,575 | 463,755 |
| Total Inter- and Intra-Zone Trips | 467,148 | 158,257 | 625,405 |
| Intra-Zone Trips — Downtown Area | 3,668 | 8,570 | 12,238 |
| Intra-Zone Trips — Other Zones | 62,247 | 34,980 | 97,227 |
| Total Intra-Zone Trips | 65,915 | 43,550 | 109,465 |
| Inter-Zone Trips — Downtown Area and Other Zones | 96,752 | 21,232 | 117,984 |
| Inter-Zone Trips — Downtown Area | 17,548 | 13,880 | 31,428 |
| Inter-Zone Trips — Between Other Zones | 286,933 | 79,595 | 366,528 |
| Total Inter-Zone Trips | 401,233 | 114,707 | 515,940 |
| Intra-Area Trips Downtown Area | 21,216 | 22,450 | 43,666 |

## APPENDIX 4

*Pertinent Data from Origin and Destination Study*

| *From External and Internal Surveys* | Average Daily | Percent |
|---|---|---|
| Total motor vehicle trips thru, into and within study area | 811,053 | 100.00 |
| Total motor vehicle trips from cordon to cordon | 8,805 | 1.09 |
| Total motor vehicle trips from cordon to zone | 176,843 | 21.80 |
| Total motor vehicle trips from zone to zone | 625,405 | 77.11 |
| Total motor vehicle trips thru, into and within study area | 811,053 | 100.00 |
| By passenger cars and taxis | 629,746 | 77.65 |
| By trucks | 181,307 | 22.35 |
| Total motor vehicle trips thru, into and within study area | 811,053 | 100.00 |
| Total motor vehicle trips thru, into and within downtown area | 206,593 | 25.47 |
| Total motor vehicle trips with origin or destination in the downtown area | 147,925 | 18.24 |
| Total motor vehicle trips passing thru downtown area without stopping | 15,002 | 1.85 |
| Total motor vehicle trips intra-area-movement downtown area | 43,666 | 5.38 |
| Total motor vehicle trips with origin or destination in zones exclusive of the downtown area | 619,462 | 76.38 |
| Total daily trips by mass transportation | 979,471 | 100.00 |
| Total daily trips by Boston Elevated* and combination | 807,600 | 82.45 |
| Total daily trips by independent bus and comhination | 123,534 | 12.61 |
| Total daily trips by railroad and combination | 48,337 | 4.94 |
| Total daily trips by Boston Elevated | 807,600 | 100.00 |
| Total daily trips by Boston Elevated between downtown area and zones | 391,797 | 48.51 |
| Total daily trips by Boston Elevated intra-area movement downtown area | 22,176 | 2.75 |
| Total daily trips by Boston Elevated between zones exclusive of the downtown area | 341,337 | 42.27 |
| Total daily trips by Boston Elevated intra-zone trips, exclusive of the downtown area | 52,290 | 6.47 |
| Total daily trips by independent hus | 123,534 | 100.00 |
| Total daily trips by independent bus between downtown area and zones | 5,775 | 4.67 |
| Total daily trips by independent bus between zones exclusive of downtown area | 100,106 | 81.04 |
| Total daily trips by independent bus intra-zone trips, exclusive of downtown area | 17,653 | 14.29 |
| Total daily trips by railroad | 48,337 | 100.00 |
| Total daily trips by railroad between downtown area and zones | 38,971 | 80.62 |
| Total daily trips by railroad intra-area movement downtown area | 105 | 0.22 |
| Total daily trips by railroad between zones exclusive of the downtown area | 9,198 | 19.03 |
| Total daily trips by railroad intra-zone trips, other zones | 63 | 0.13 |

*Boston Elevated is now operated by the Metropolitan Transit Authority.

| *From External Survey* | Daily Average | Percent |
|---|---|---|
| Total motor vehicles into study area crossing cordon | 194,453 | 100.00 |
| Total motor vehicles with origin or destination in downtown area | 29,941 | 15.40 |
| Total motor vehicles thru area crossing cordon line | 17,610 | 9.05 |
| Total motor vehicles with origin or destination in zones exclusive of downtown area | 146,902 | 75.55 |

## APPENDIX 5

*Points of Origins and Destinations by Cities and Towns*
*All Types of Motor Vehicles*

| City or Town | INTRA-AREA MOVEMENT | | | INTER-AREA MOVEMENT | | | Grand Total |
|---|---|---|---|---|---|---|---|
| | Passenger & Taxi | Trucks | Total | Passenger & Taxi | Trucks | Total | |
| Arlington | 21,876 | 5,440 | 27,316 | 3,891 | 389 | 4,280 | 31,596 |
| Belmont | 21,328 | 4,350 | 25,678 | 1,413 | 53 | 1,466 | 27,144 |
| Boston: | | | | | | | |
| Downtown | 139,132 | 66,242 | 205,374 | 26,522 | 3,309 | 29,831 | 235,205 |
| Brighton | 27,636 | 12,320 | 39,956 | 3,223 | 418 | 3,641 | 43,597 |
| Roxbury | 60,912 | 29,680 | 90,592 | 7,625 | 975 | 8,600 | 99,192 |
| Charlestown | 13,854 | 7,350 | 21,204 | 2,731 | 732 | 3,463 | 24,667 |
| Dorchester | 37,434 | 15,902 | 53,336 | 3,812 | 481 | 4,293 | 57,629 |
| East Boston | 13,002 | 7,940 | 20,942 | 1,526 | 513 | 2,039 | 22,981 |
| Hyde Park | 7,879 | 2,980 | 10,859 | 1,704 | 176 | 1,880 | 12,739 |
| South Boston | 21,601 | 12,890 | 34,491 | 3,767 | 1,319 | 5,086 | 39,577 |
| West Roxbury | 27,151 | 10,030 | 37,181 | 3,148 | 229 | 3,377 | 40,558 |
| Braintree | 18,935 | 1,450 | 20,385 | 2,454 | 366 | 2,820 | 23,205 |
| Brookline | 31,290 | 11,500 | 42,790 | 2,601 | 113 | 2,714 | 45,504 |
| Cambridge | 62,009 | 22,681 | 84,690 | 9,343 | 1,919 | 11,262 | 95,952 |
| Chelsea | 11,393 | 6,610 | 18,003 | 1,419 | 542 | 1,961 | 19,964 |
| Dedham | 8,325 | 2,261 | 10,586 | 3,353 | 417 | 3,770 | 14,356 |
| Everett | 14,730 | 4,950 | 19,680 | 1,920 | 622 | 2,542 | 22,222 |
| Lynn | 41,730 | 10,570 | 52,300 | 20,000 | 2,310 | 22,310 | 74,610 |
| Malden | 34,051 | 4,760 | 38,811 | 3,651 | 371 | 4,022 | 42,833 |
| Medford | 22,729 | 6,310 | 29,039 | 3,797 | 400 | 4,197 | 33,236 |
| Melrose | 18,080 | 3,460 | 21,540 | 3,349 | 308 | 3,657 | 25,197 |
| Milton | 11,254 | 2,890 | 14,144 | 1,513 | 118 | 1,631 | 15,775 |
| Newton | 63,414 | 10,331 | 73,745 | 9,685 | 926 | 10,611 | 84,356 |
| Quincy | 67,521 | 9,533 | 77,054 | 7,642 | 1,039 | 8,681 | 85,735 |
| Revere | 13,102 | 3,830 | 16,932 | 1,101 | 257 | 1,358 | 18,290 |
| Saugus | 9,807 | 1,170 | 10,977 | 1,388 | 172 | 1,560 | 12,537 |
| Somerville | 27,008 | 16,130 | 43,138 | 3,711 | 1,133 | 4,844 | 47,982 |
| Waltham | 29,711 | 8,524 | 38,235 | 7,376 | 890 | 8,266 | 46,501 |
| Watertown | 23,060 | 7,250 | 30,310 | 1,979 | 335 | 2,314 | 32,624 |
| Weymouth | 14,189 | 2,610 | 16,799 | 4,910 | 624 | 5,534 | 22,333 |
| Winchester | 9,382 | 2,650 | 12,032 | 3,911 | 453 | 4,364 | 16,396 |
| Winthrop | 10,771 | 1,920 | 12,691 | 418 | 51 | 469 | 13,160 |
| Totals | 934,296 | 316,514 | 1,250,810 | 154,883 | 21,960 | 176,843 | 1,427,653 |

## APPENDIX 6

*Points of Origins and Destinations by Cities and Towns*
*Mass Transportation*

| City or Town | BY RAILROAD | | | BY INDEPENDENT BUS | | | BY BOSTON ELEVATED* | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alone | In Combination | Total | Alone | In Combination | Total | Alone | In Combination | Total | |
| Arlington | 1,155 | 357 | 1,512 | 42 | 147 | 189 | 23,016 | 798 | 23,814 | 25,515 |
| Belmont | 231 | 147 | 378 | 378 | 252 | 630 | 13,944 | 568 | 14,512 | 15,520 |
| Boston: | | | | | | | | | | |
| Downtown | 28,676 | 10,505 | 39,181 | 3,696 | 2,079 | 5,775 | 409,584 | 26,565 | 436,149 | 481,105 |
| Brighton | 1,241 | 168 | 1,409 | 252 | 126 | 378 | 58,737 | 1,764 | 60,501 | 62,288 |
| Roxbury | 441 | 1,260 | 1,701 | 294 | 462 | 756 | 192,911 | 3,003 | 195,914 | 198,371 |
| Charlestown | 336 | 273 | 609 | 504 | 21 | 525 | 46,695 | 777 | 47,472 | 48,606 |
| Dorchester | 336 | 126 | 462 | 273 | 252 | 525 | 117,696 | 1,953 | 119,649 | 120,636 |
| E. Boston | 42 | 399 | 441 | 294 | 42 | 336 | 51,316 | 1,827 | 53,143 | 53,920 |
| Hyde P'k | 420 | 273 | 693 | 105 | 63 | 168 | 20,580 | 693 | 21,273 | 22,134 |
| S. Boston | 1,029 | 1,050 | 2,079 | ..... | 483 | 483 | 76,358 | 1,233 | 77,591 | 80,153 |
| W. Roxb'y | 2,331 | 168 | 2,499 | 609 | ..... | 609 | 61,951 | 777 | 62,728 | 65,836 |
| Braintree | 1,407 | 2,142 | 3,549 | 8,190 | 231 | 8,421 | ..... | 609 | 609 | 12,579 |
| Brookline | 1,134 | 231 | 1,365 | 42 | ..... | 42 | 33,684 | 987 | 34,671 | 36,078 |
| Cambridge | 147 | 966 | 1,113 | 357 | 357 | 714 | 132,174 | 2,310 | 134,484 | 136,311 |
| Chelsea | 126 | 42 | 168 | 379 | 126 | 505 | 21,273 | 441 | 21,714 | 22,387 |
| Dedham | 462 | ..... | 462 | 5,544 | 189 | 5,733 | 231 | 987 | 1,218 | 7,413 |
| Everett | 42 | 42 | 84 | 336 | 546 | 882 | 32,340 | 189 | 32,529 | 33,495 |
| Lynn | 840 | 1,197 | 2,037 | 74,005 | 2,520 | 76,525 | 84 | 420 | 504 | 79,066 |
| Malden | 987 | 1,239 | 2,226 | 5,523 | 651 | 6,174 | 53,248 | 609 | 53,857 | 62,257 |
| Medford | 1,458 | 189 | 1,647 | 105 | ..... | 105 | 41,335 | 1,008 | 42,343 | 44,095 |
| Melrose | 2,562 | 1,665 | 4,227 | 10,017 | 672 | 10,689 | 210 | 3,948 | 4,158 | 19,074 |
| Milton | ..... | ..... | ..... | 2,457 | 105 | 2,562 | 2,079 | 6,552 | 8,631 | 11,193 |
| Newton | 7,161 | 1,134 | 8,295 | 18,753 | 252 | 19,005 | 6,447 | 9,996 | 16,443 | 43,743 |
| Quincy | 7,854 | 5,249 | 13,103 | 50,043 | 798 | 50,841 | 6,195 | 3,548 | 9,743 | 73,687 |
| Revere | 42 | 42 | 84 | 4,387 | 42 | 4,429 | 25,552 | 84 | 25,636 | 30,149 |
| Saugus | 210 | 63 | 273 | 8,883 | 609 | 9,492 | ..... | 147 | 147 | 9,912 |
| Somerville | 378 | 63 | 441 | ..... | ..... | ..... | 70,203 | 1,617 | 71,820 | 72,261 |
| Waltham | 798 | 588 | 1,386 | 18,648 | 126 | 18,774 | 42 | 4,893 | 4,935 | 25,095 |
| Watertown | 42 | 168 | 210 | 2,079 | 21 | 2,100 | 23,667 | 945 | 24,612 | 26,922 |
| Weymouth | 1,092 | 1,176 | 2,268 | 7,455 | 273 | 7,728 | ..... | 189 | 189 | 10,185 |
| Winchester | 2,016 | 756 | 2,772 | 4,872 | ..... | 4,872 | ..... | 2,730 | 2,730 | 10,374 |
| Winthrop | ..... | ..... | ..... | 6,954 | 147 | 7,101 | 462 | 11,019 | 11,481 | 18,582 |
| Totals | 64,996 | 31,678 | 96,674 | 235,476 | 11,592 | 247,068 | 1,522,014 | 93,186 | 1,615,200 | 1,958,942 |

*Now Metropolitan Transit Authority.

# APPENDIX 7

*Total Daily Trips Made by All Types of Motor Vehicles between the Downtown Area of Boston and Zones and Roadside Interview Stations Within Each Area*

| Area | Between Downtown Area and Zones not in Downtown | | Between Downtown Area and Roadside Interview Stations | | | Total Movement | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Daily Trips | | | Daily Trips | | Daily Trips | | | |
| | Number | Percent | Number of Stations | Number | Percent | Number | Percent | Percent Total Trips Between Downtown Area and Zones | Percent Total Trips Between Downtown Area and Roadside Interview Stations |
| 1 . . . . . | 18,277 | 15.49 | 12 | 6,725 | 22.46 | 25,002 | 16.90 | 73.10 | 26.90 |
| 2 . . . . . | 16,519 | 14.01 | 6 | 2,934 | 9.80 | 19,453 | 13.15 | 84.92 | 15.08 |
| 3 . . . . . | 34,595 | 29.32 | 8 | 7,532 | 25.16 | 42,127 | 28.48 | 82.12 | 17.88 |
| 4 . . . . . | 22,017 | 18.66 | 9 | 7,651 | 25.55 | 29,668 | 20.06 | 74.21 | 25.79 |
| 5 . . . . . | 8,500 | 7.20 | 3 | 1,499 | 5.01 | 9,999 | 6.76 | 85.00 | 15.00 |
| 6 . . . . . | 9,981 | 8.46 | 9 | 3,600 | 12.02 | 13,581 | 9.18 | 73.49 | 26.51 |
| 7 . . . . . | 8,095 | 6.86 | — | — | — | 8,095 | 5.47 | 100.00 | — |
| Total . . . . . | 117,984 | 100.00 | 47 | 29,941 | 100.00 | 147,925 | 100.00 | 79.76 | 20.24 |

Area 1 — from the south and includes Weymouth, Braintree, Quincy, Milton, Dorchester, Roxbury and 12 roadside interview stations.

Area 2 — from the southwest and includes Dedham, Jamaica Plain, West Roxbury, Hyde Park and 6 roadside interview stations.

Area 3 — from the west and includes Allston, Brighton, Brookline, Newton, Waltham, Watertown, and 8 roadside interview stations.

Area 4 — from the northwest and includes Arlington, Belmont, Cambridge, Medford, Somerville, Winchester and 9 roadside interview stations.

Area 5 — from the north and includes Charlestown, Everett, Malden, Melrose and 3 roadside interview stations.

Area 6 — from the northeast and includes Chelsea, Lynn, Revere, Saugus, East Boston, Winthrop, and 9 roadside interview stations.

Area 7 — South Boston.

# APPENDIX B

## COST ESTIMATE TABLES

# APPENDIX B—ESTIMATES OF COST

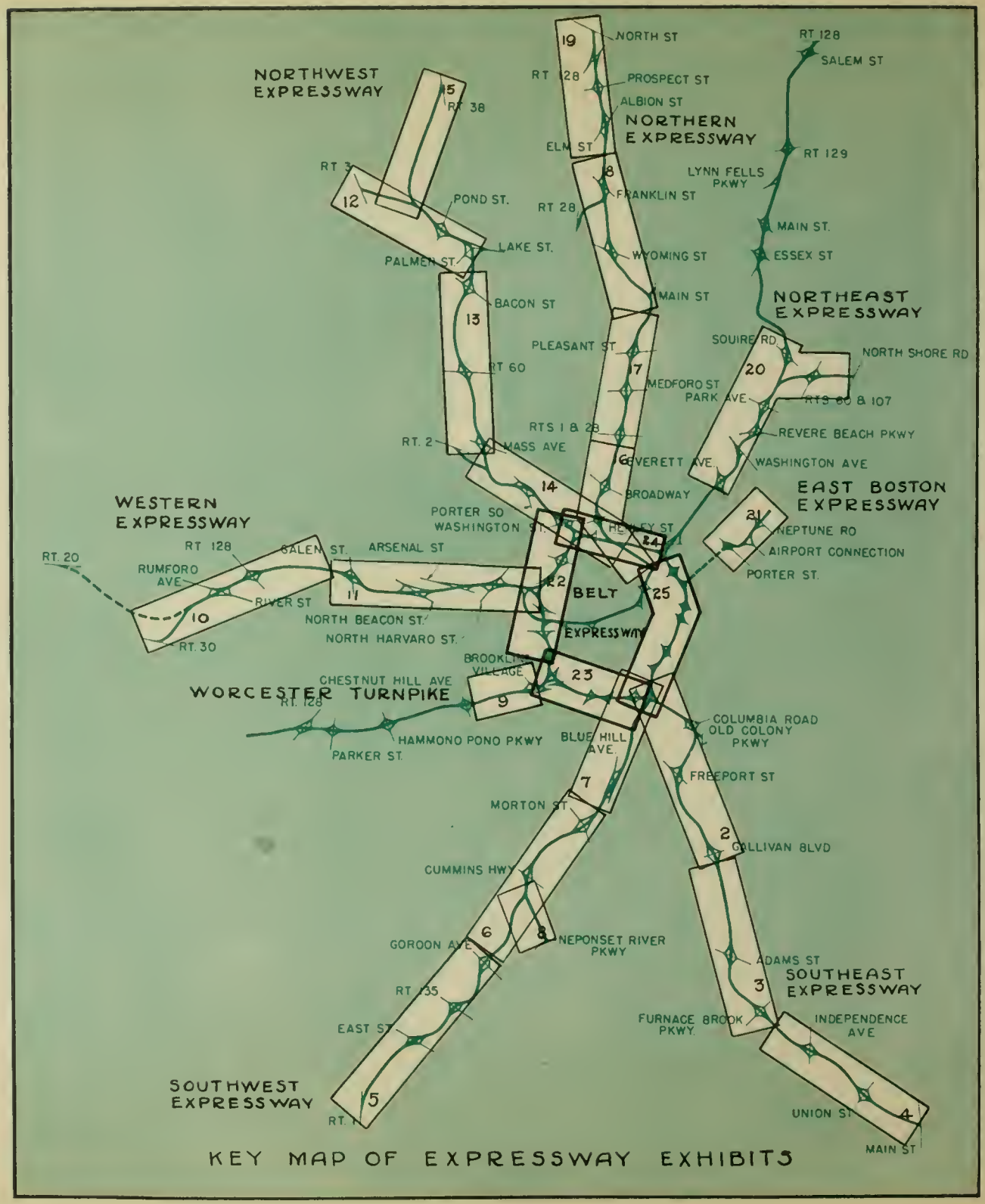
| Description | No. of Lanes | Mileage | CONSTRUCTION: Changes of Utilities | Construction Cost Including Contingencies | Preliminary Cost | Engineering | Demolition | Maintenance of Traffic | RIGHTS OF WAY: Assessed Value of Right of Way | Acquisition of Right of Way | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOUTHEAST EXPRESSWAY | | | | | | | | | | | |
| a. Expressway Belt to Old Colony Boulevard | 6 | 1.30 | $250,000 | $2,660,000 | $25,000 | $265,000 | $15,000 | $ 75,000 | $ 970,000 | $140,000 | $ 4,400,000 |
| b. Old Colony Boulevard to Gallivan Boulevard | 6 | 2.54 | 640,000 | 3,330,000 | 30,000 | 330,000 | 40,000 | 100,000 | 1,960,000 | 290,000 | 6,720,000 |
| c. Gallivan Boulevard to Routes 3 and 18 | 6 | 7.99 | 860,000 | 11,510,000 | 115,000 | 1,155,000 | 55,000 | 345,000 | 2,460,000 | 380,000 | 16,880,000 |
| | | 11.83 | 1,750,000 | 17,500,000 | 170,000 | 1,750,000 | 110,000 | 520,000 | 5,390,000 | 810,000 | 28,000,000 |
| SOUTHWEST EXPRESSWAY | | | | | | | | | | | |
| a. Expressway Belt to Washington Street and Blue Hill Avenue | 6 | 1.77 | 380,000 | 2,140,000 | 20,000 | 215,000 | 60,000 | 65,000 | 2,890,000 | 430,000 | 6,200,000 |
| b. Washington Street and Blue Hill Avenue to Neponset Parkway Connection | 6 | 3.14 | 470,000 | 3,270,000 | 35,000 | 330,000 | 15,000 | 100,000 | 720,000 | 110,000 | 5,050,000 |
| c. Neponset Parkway Connection | 4 | 1.08 | 110,000 | 1,100,000 | 10,000 | 110,000 | 5,000 | 35,000 | 240,000 | 40,000 | 1,650,000 |
| d. Neponset Parkway Connection to U. S. Route 1 | 4 | 5.44 | 820,000 | 7,350,000 | 75,000 | 735,000 | 30,000 | 220,000 | 1,280,000 | 190,000 | 10,700,000 |
| | | 11.43 | 1,780,000 | 13,860,000 | 140,000 | 1,390,000 | 110,000 | 420,000 | 5,130,000 | 770,000 | 23,600,000 |
| STATE ROUTE 9—Worcester Turnpike | | | | | | | | | | | |
| a. Expressway Belt to Sumner Road and Warren Street | 6 | 1.39 | 350,000 | 3,130,000 | 31,000 | 310,000 | 34,000 | 95,000 | 1,710,000 | 260,000 | 5,920,000 |
| b. Improvements to Route 9—Sumner Road to Hammond Pond Parkway | 6 | 2.35 | 100,000 | 1,160,000 | 12,000 | 120,000 | 23,000 | 35,000 | 1,070,000 | 160,000 | 2,680,000 |
| | | 3.74 | 450,000 | 4,290,000 | 43,000 | 430,000 | 57,000 | 130,000 | 2,780,000 | 420,000 | 8,600,000 |
| WESTERN EXPRESSWAY | | | | | | | | | | | |
| a. Expressway Belt to Galen Street | 6 | 3.71 | 560,000 | 6,780,000 | 70,000 | 680,000 | 24,000 | 200,000 | 1,206,000 | 180,000 | 9,700,000 |
| b. Galen Street to Commonwealth Avenue — Route 30 | 6 | 4.02 | 500,000 | 5,750,000 | 60,000 | 580,000 | 26,000 | 170,000 | 1,314,000 | 200,000 | 8,600,000 |
| | | 7.73 | 1,060,000 | 12,530,000 | 130,000 | 1,260,000 | 50,000 | 370,000 | 2,520,000 | 380,000 | 18,300,000 |
| NORTHWEST EXPRESSWAY | | | | | | | | | | | |
| a. Expressway Belt to Concord Turnpike Connection | 6 | 2.18 | 330,000 | 3,620,000 | 35,000 | 360,000 | 52,000 | 110,000 | 2,370,000 | 353,000 | 7,230,000 |
| b. Concord Turnpike Connection to Massachusetts Avenue at Alewife Brook Parkway | 4 | 0.47 | 70,000 | 500,000 | 5,000 | 50,000 | 20,000 | 20,000 | 580,000 | 85,000 | 1,330,000 |
| c. Concord Turnpike Connection | 4 | 0.95 | 50,000 | 1,340,000 | 10,000 | 130,000 | 3,000 | 40,000 | 150,000 | 27,000 | 1,750,000 |
| d. Massachusetts Avenue at Alewife Brook Parkway to Bacon Street, Winchester | 4 | 2.43 | 360,000 | 3,080,000 | 30,000 | 310,000 | 23,000 | 90,000 | 947,000 | 140,000 | 4,980,000 |
| e. Bacon Street, Winchester, to U. S. Route 3 | 4 | 4.06 | 220,000 | 3,910,000 | 40,000 | 390,000 | 10,000 | 120,000 | 490,000 | 70,000 | 5,250,000 |
| f. Woburn By-pass Connection to Route 38 | 4 | 2.05 | 100,000 | 1,990,000 | 20,000 | 200,000 | 2,000 | 60,000 | 163,000 | 25,000 | 2,560,000 |
| | | 12.14 | 1,130,000 | 14,440,000 | 140,000 | 1,440,000 | 110,000 | 440,000 | 4,700,000 | 700,000 | 23,100,000 |

# APPENDIX B—ESTIMATES OF COST

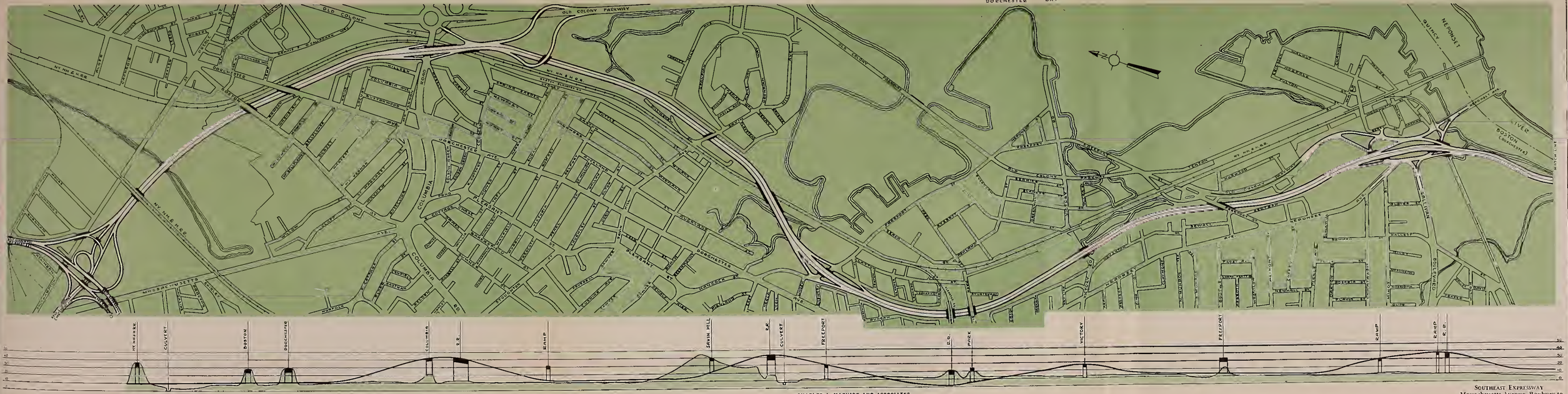
| *Description* | *No. of Lanes* | *Mileage* | *CONSTRUCTION* | | | | | | *RIGHTS OF WAY* | | *Totals* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Changes of Utilities* | *Construction Cost Including Contingencies* | *Preliminary Cost* | *Engineering* | *Demolition* | *Maintenance of Traffic* | *Assessed Value of Right of Way* | *Acquisition of Right of Way* | |
| NORTHERN EXPRESSWAY | | | | | | | | | | | |
| a. Nashua Street to Revere Beach Parkway | 6 | 3.15 | $630,000 | $4,260,000 | $40,000 | $425,000 | $50,000 | $125,000 | $2,110,000 | $320,000 | $ 7,960,000 |
| b. Stoneham By-pass — Fellsway West to North Street, Reading | 4 | 4.35 | 550,000 | 4,610,000 | 45,000 | 460,000 | 5,000 | 135,000 | 300,000 | 45,000 | 6,150,000 |
| c. Revere Beach Parkway to Main Street, Melrose | 6 | 2.75 | 390,000 | 5,910,000 | 60,000 | 590,000 | 53,000 | 180,000 | 2,350,000 | 357,000 | 9,890,000 |
| d. Main Street, Melrose to Stoneham By-pass | 4 | 2.27 | 270,000 | 2,640,000 | 25,000 | 265,000 | 2,000 | 80,000 | 100,000 | 18,000 | 3,400,000 |
| | | 12.52 | 1,840,000 | 17,420,000 | 170,000 | 1,740,000 | 110,000 | 520,000 | 4,860,000 | 740,000 | 27,400,000 |
| NORTHEAST EXPRESSWAY | | | | | | | | | | | |
| a. Mystic River Bridge | 6 | 1.54 | | | | | | | | | |
| b. Connection and Revisions to South End of Mystic River Bridge | 6 | 0.46 | | 2,360,000 | 20,000 | 235,000 | 12,000 | 70,000 | 600,000 | 93,000 | 3,390,000 |
| c. Connection and Revisions to North End of Mystic River Bridge | 6 | 0.21 | 100,000 | 800,000 | 10,000 | 80,000 | 6,000 | 25,000 | 294,000 | 45,000 | 1,360,000 |
| d. Mystic River Bridge to "Y" Interchange — Revere | 6 | 1.99 | 410,000 | 3,530,000 | 35,000 | 355,000 | 33,000 | 105,000 | 1,342,000 | 200,000 | 6,010,000 |
| e. "Y" Interchange — Revere to Cutler Highway and Squire Road | 4 | 0.66 | 120,000 | 980,000 | 10,000 | 100,000 | 1,000 | 30,000 | 89,000 | 10,000 | 1,340,000 |
| f. "Y" Interchange — Revere to Broadway, Route 107 | 4 | 0.74 | 120,000 | 1,020,000 | 10,000 | 100,000 | 7,000 | 30,000 | 350,000 | 53,000 | 1,690,000 |
| g. Broadway, Route 107, to Route 1A | 4 | 0.79 | 90,000 | 580,000 | 5,000 | 55,000 | 2,000 | 15,000 | 115,000 | 18,000 | 880,000 |
| h. Improvements to U. S. Route 1 — Squire Road to Route 128 | 6 | 6.60 | 250,000 | 2,140,000 | 20,000 | 215,000 | 49,000 | 65,000 | 2,160,000 | 331,000 | 5,230,000 |
| | | 12.99 | 1,090,000 | 11,410,000 | 110,000 | 1,140,000 | 110,000 | 340,000 | 4,950,000 | 750,000 | 19,900,000 |
| EAST BOSTON EXPRESSWAY | | | | | | | | | | | |
| a. Proposed Tunnel | 2 | 1.27 | | 15,000,000 | 150,000 | 1,500,000 | 10,000 | 450,000 | 390,000 | 60,000 | 17,560,000 |
| b. East Boston Elevated Highway | 6 | 1.24 | 200,000 | 6,200,000 | 60,000 | 630,000 | 20,000 | 180,000 | 1,000,000 | 150,000 | 8,440,000 |
| | | 2.51 | 200,000 | 21,200,000 | 210,000 | 2,130,000 | 30,000 | 630,000 | 1,390,000 | 210,000 | 26,000,000 |
| EXPRESSWAY BELT | | | | | | | | | | | |
| a. Mystic River Bridge Connection via Central Artery to Southeast and Southwest Expressway Interchange | 6 | 3.40 | 1,550,000 | 34,660,000 | 345,000 | 3,460,000 | 190,000 | 1,030,000 | 15,890,000 | 2,375,000 | 59,500,000 |
| b. Southeast and Southwest Expressway Interchange to Northwest Expressway Interchange | 6 | 4.69 | 1,230,000 | 16,430,000 | 165,000 | 1,650,000 | 120,000 | 490,000 | 6,310,000 | 955,000 | 27,350,000 |
| c. Northwest Expressway Interchange to Mystic River Bridge Connection | 6 | 2.64 | 920,000 | 8,910,000 | 90,000 | 890,000 | 100,000 | 270,000 | 4,760,000 | 710,000 | 16,650,000 |
| | | 10.73 | 3,700,000 | 60,000,000 | 600,000 | 6,000,000 | 410,000 | 1,790,000 | 26,960,000 | 4,040,000 | 103,500,000 |
| EMBANKMENT ROAD | | | | | | | | | | | |
| a. Charles Street to Bay State Road | 6 | 1.98 | | | | | | | | | 6,200,000 |
| *IMPROVEMENTS TO EXISTING STREET SYSTEM* | | | | 26,000,000 | | | | | 9,900,000 | 1,500,000 | 37,400,000 |

# APPENDIX C

## KEY MAP AND EXPRESSWAY PLANS AND PROFILES




KEY MAP OF EXPRESSWAY EXHIBITS




SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

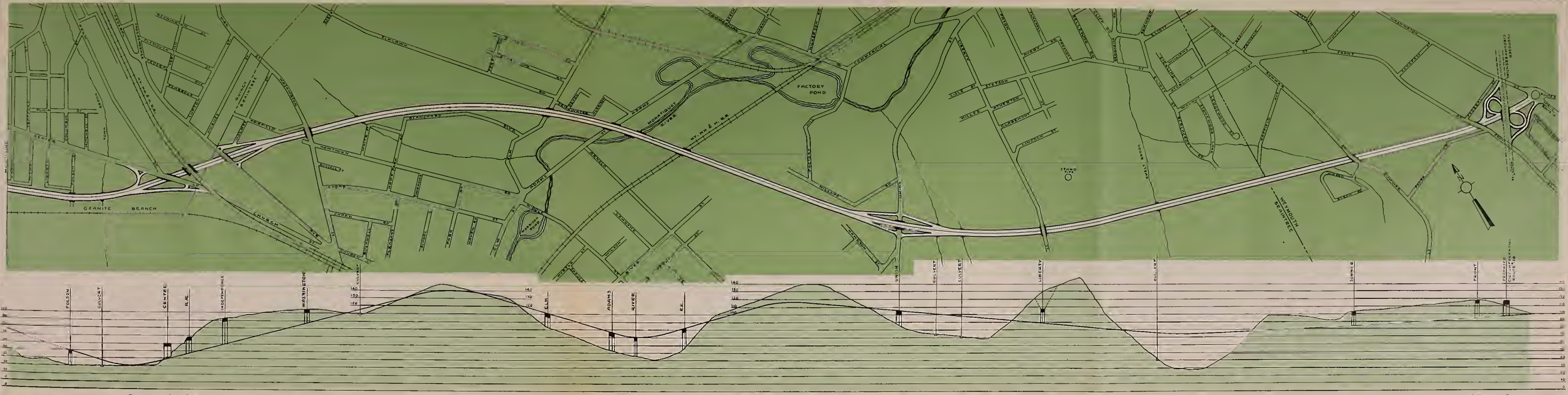
SOUTHEAST EXPRESSWAY
Massachusetts Avenue, Roxbury to Neponset River, Quincy

SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

SOUTHEAST EXPRESSWAY
Neponset River, Quincy to Rodman Street, Quincy




Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

SOUTHEAST EXPRESSWAY
Rodman Street, Quincy to Washington Street, Weymouth

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

SOUTHWEST EXPRESSWAY
Providence Pike U.S. Number 1, Westwood to Austin Street, Hyde Park

Expressway locations shown are subject to change in final design.

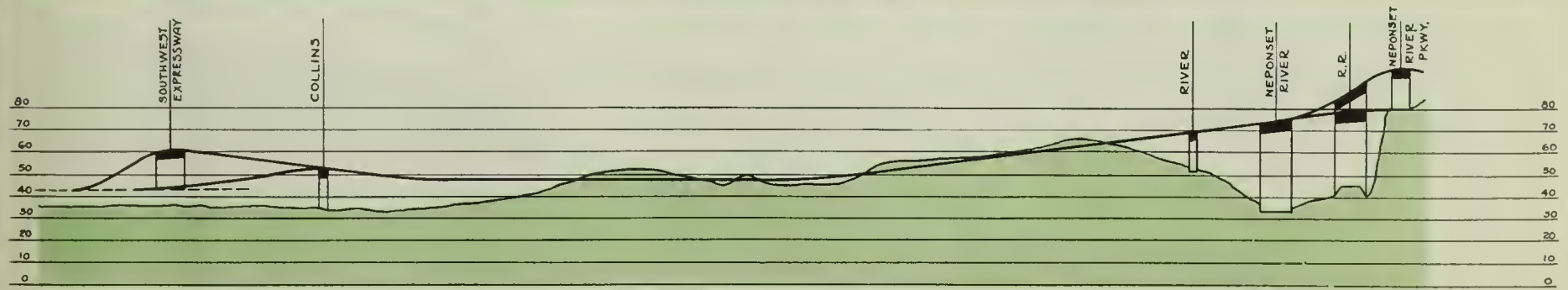
CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
OeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

SOUTHWEST EXPRESSWAY
Austin Street, Hyde Park to Austin Street, Dorchester

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

SOUTHWEST EXPRESSWAY
Austin Street, Dorchester to Massachusetts Avenue, Roxbury

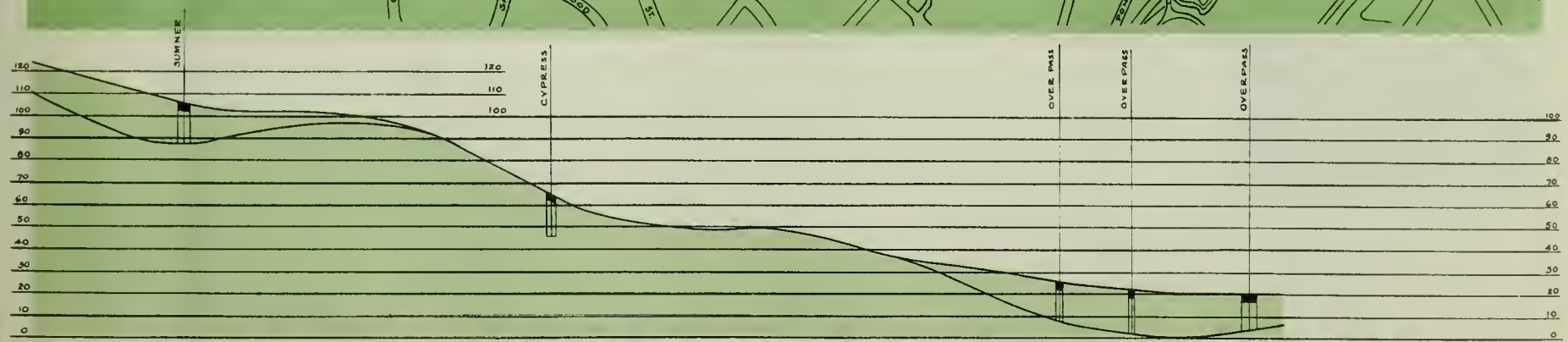



SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
OeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

SOUTHWEST EXPRESSWAY
Newburn Street, Hyde Park to Neponset River Parkway, Milton




SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

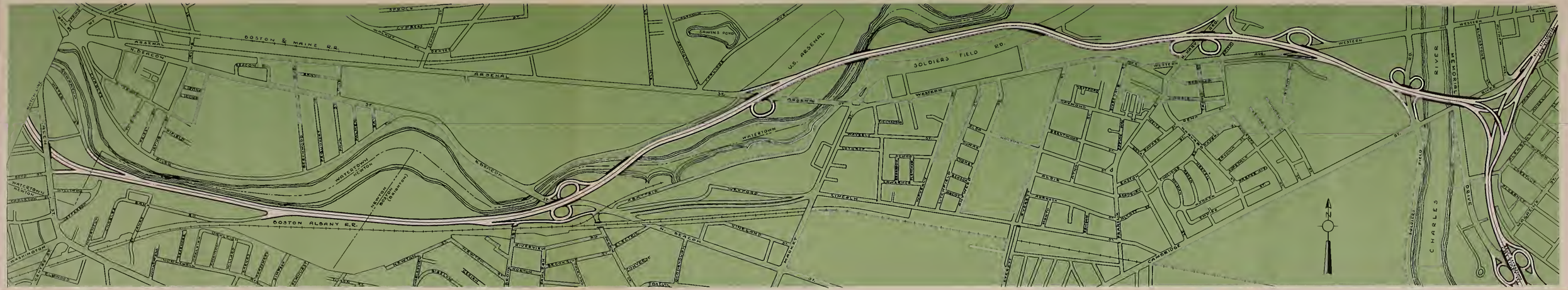
CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

WORCESTER TURNPIKE
State Route 9—Sumner Road, Brookline to Riverway
(U.S. Route Number 1), Brookline

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

WESTERN EXPRESSWAY
Commonwealth Avenue, Newton to Galen Street, Watertown



SCALE IN FEET
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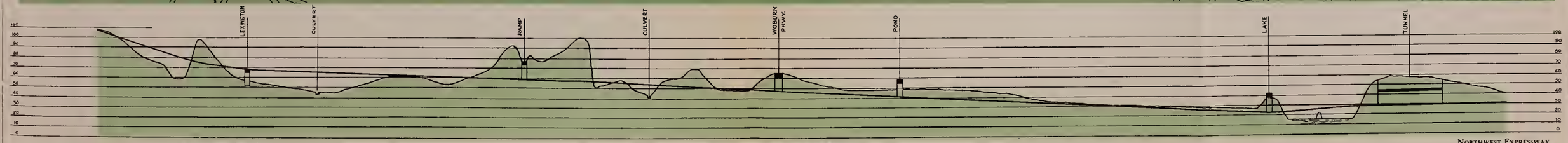
Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

WESTERN EXPRESSWAY
Galen Street, Watertown to
Memorial Drive, Cambridge

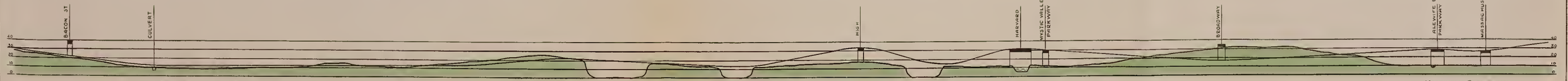



SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

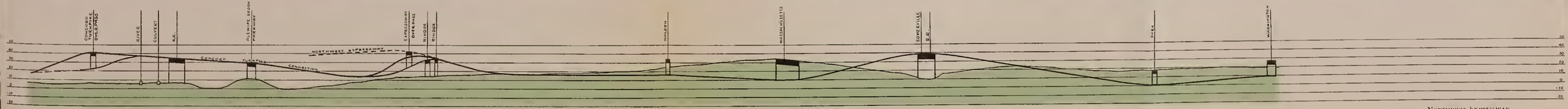
NORTHWEST EXPRESSWAY
Cambridge Street, Woburn to Bacon Street, Winchester




Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

NORTHWEST EXPRESSWAY
Bacon Street, Winchester to Massachusetts Avenue, Cambridge




SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

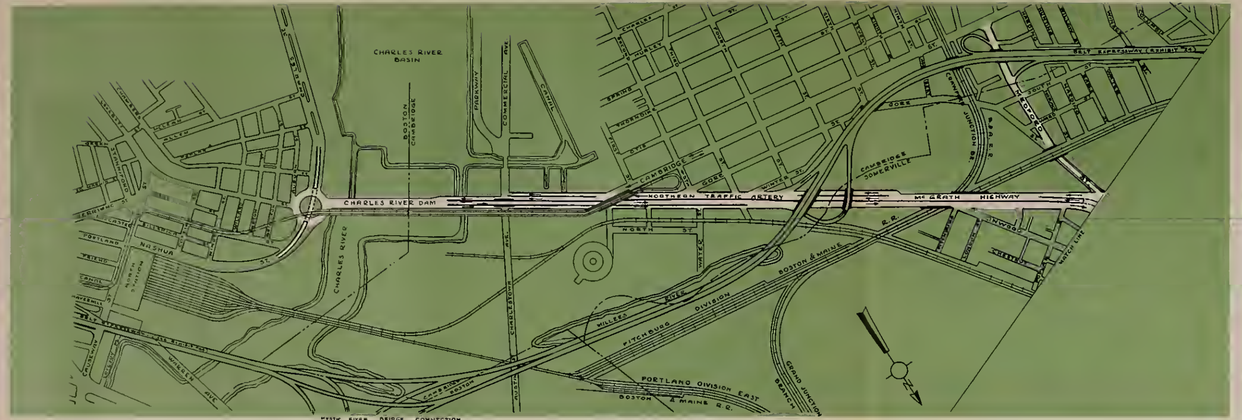
NORTHWEST EXPRESSWAY
Massachusetts Avenue, Cambridge to Webster Avenue, Somerville

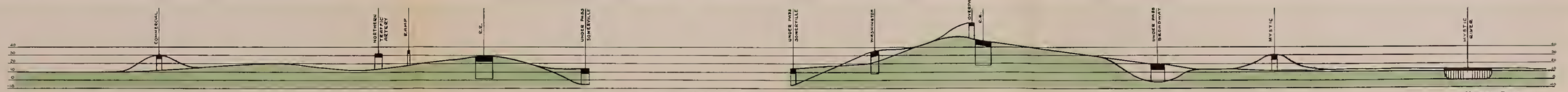
SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

NORTHWEST EXPRESSWAY
N.W. Expressway, Woburn to Elm Street, Woburn






Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

NORTHERN EXPRESSWAY
Nashua Street, Boston to
Mystic Valley Parkway, Medford

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

NORTHERN EXPRESSWAY
Mystic Valley Parkway, Medford to Goodyear Avenue, Melrose

Expressway locations shown are subject to change in final design.

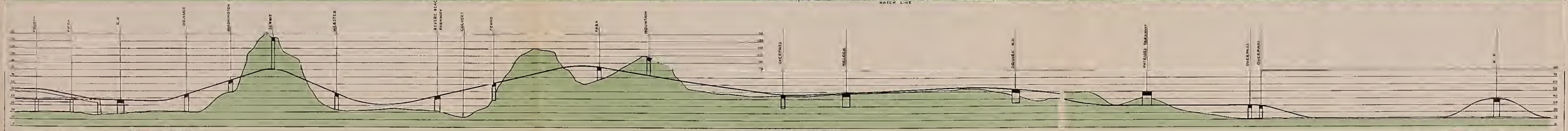
CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

NORTHERN EXPRESSWAY
Goodyear Avenue, Melrose to Spring Street, Stoneham

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
OsLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

NORTHERN EXPRESSWAY
Spring Street, Stoneham to North Avenue, Reading




Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

NORTHEAST EXPRESSWAY
Mystic River Bridge, Chelsea to Cutler Highway, Revere

SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

EAST BOSTON EXPRESSWAY
Sumner Tunnel, East Boston to Harmony Street, East Boston

Expressway locations shown are subject to change in final design.

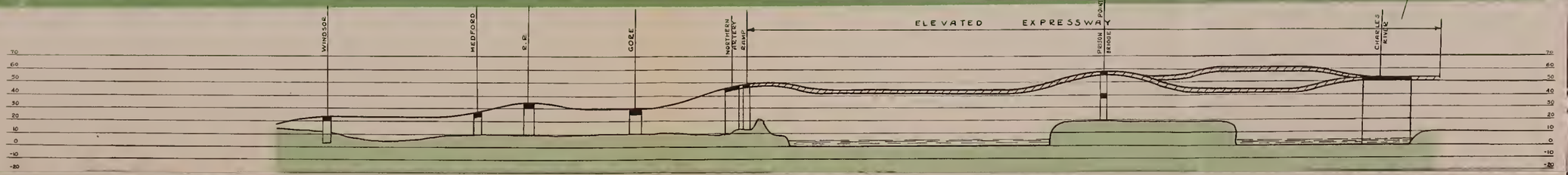
CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
OeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

BELT ROUTE — INCLUDING CENTRAL ARTERY
Water Street, Somerville to Colchester Street, Brookline

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
OeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

BELT ROUTE — INCLUDING CENTRAL ARTERY
Colchester Street, Brookline to Massachusetts Avenue, Roxbury

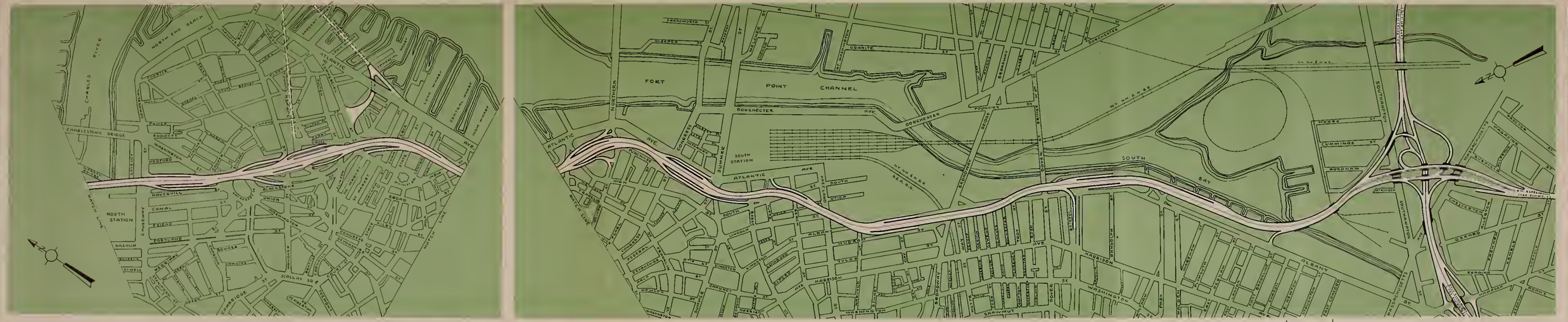



SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. J. E. GREINER COMPANY
Chicago Baltimore

BELT ROUTE — INCLUDING CENTRAL ARTERY
Water Street, Somerville to
Warren Avenue Bridge, Boston




SCALE IN FEET
500 0 500 1000

Expressway locations shown are subject to change in final design.

CHARLES A. MAGUIRE AND ASSOCIATES
Engineers — Boston
DeLEUW, CATHER & CO. Chicago
J. E. GREINER COMPANY Baltimore

BELT ROUTE — INCLUDING CENTRAL ARTERY
Warren Avenue Bridge, Boston to Massachusetts Avenue, Roxbury

# MAPS

# THE MASTER HIGHWAY PLAN

FOR THE

BOSTON METROPOLITAN AREA

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## DOWNTOWN BOSTON

SHOWING CENTRAL ARTERY, EMBANKMENT ROAD,
SURFACE STREET IMPROVEMENTS AND ONE-WAY STREETS

1937

# DOWNTOWN BOSTON

SHOWING CENTRAL ARTERY, EMBANKMENT ROAD,
SURFACE STREET IMPROVEMENTS AND ONE-WAY STREETS

ACCOMPANYING REPORT ON

## THE MASTER HIGHWAY PLAN

FOR THE

BOSTON METROPOLITAN AREA

PREPARED FOR

THE JOINT BOARD FOR THE
METROPOLITAN MASTER HIGHWAY PLAN

BY

CHARLES A. MAGUIRE AND ASSOCIATES
ENGINEERS BOSTON

IN COOPERATION WITH

DELEUW, CATHER & CO. CHICAGO

J. E. GREINER CO. BALTIMORE

SCALE IN FEET

CHARLES

RIVER

LAGOON

BOAT HAVEN

PUBLIC GARDEN

BOSTON COMMON

N

HARVARD BRIDGE

LONGFELLOW BRIDGE

BAY STATE RD

BEACON ST

WEST CHARLESGATE

EAST CHARLESGATE

MARLBOROUGH ST

COMMONWEALTH AVE

NEWBURY ST

BOYLSTON ST

AND

HEMENWAY ST

WESTLAND AVE

BATAVIA ST

HAVILAND ST

BICKERSTAFF ST

MORAVIA ST

BELVIDERE ST

SCOTIA ST

ST GERMAIN ST

GLENWAY ST

DALTON ST

MASSACHUSETTS AVE

ALBANY ST

HERETOAD

GLOUCESTER

FAIRFIELD

EXETER

FALMOUTH ST

CAMDEN ST

HUNTINGTON AVE

ST BOTOLPH

NEW YORK ST

W NEWTON

CUMBERLAND

DUNKIRK

ALEXANDRIA

BLACKWOOD ST

WELLINGTON

CLAREMONT

W RUTLAND SQ

GARRISON

IRVINGTON

TOLLEN ST

HARCOURT

PEMBROKE

HOLYOKE

W CANTON

YARMOUTH

RAILROAD

STUART

TRINITY PL

STANHOPE

STANHOPE ST

CHANDLER

APPLETON

ST JAMES AVE

PROVINCE

PARK SQ

ARLINGTON

ISABELLA

DARTMOUTH

BERKELEY

CLARENDON

COPLEY SQ

BOYLSTON

ELIOT

TREMONT

MASON

AVERY

WINCHESTER

CHESTNUT

BERKELEY

MT VERNON

BRIMMER

BYRON

CEDAR

CHARLES

CHARLES

CHARLES RIVER DAM

CHARLESTOWN

WARREN BRIDGE

CHARLESTOWN BRIDGE

UNITED STATES NAVY YARD

NAVY YARD

DRY DOCK

LOCK

NASHUA ST

MASSACHUSETTS GENERAL HOSPITAL

NORTH STATION

CAUSEWAY ST

LOVEJOY ST

CAMBRIDGE

AUBURN ST

BRIGHTON

ALLEN

CHAMBERS ST

BARTON ST

WILLARD ST

MINOT ST

COTTING ST

LOWELL

BELKNAP

CHUSEWAY

FAIRMAN

PICKERN

ALDOSON

NO RUSSELL ST

GREEN

LIVERETT

MERRIMAC

NORMAN

HALL ST

ROBERTS ST

PITTS ST

CHARDON

BOWKER ST

FARMINS ST

MARKET

CANAL

HANCOCK

DEANE

TEMPLE

ALLSTON

BULFINCH

HOWARD

BOWDOIN

SOMERSET

REVERE

NORTH

THACHER

COOPER

SNOW HILL

SPRUCE

SALEM

ONLY

BENNET

BOLTON

RICHMOND

NO MARKET

SO MARKET

STATE

MERCHANTS

CAPTAIN

MERCANTILE ST

COMMERCIAL

NORTH END BEACH

CONSTITUTION WHF

BATTERY WHF

BATTERY ST

CLARK

FLEET

MOON

LINCOLN WHF

SARGENTS WHF

LEWIS WHF

PROPOSED SECOND TUNNEL

HARBOR

BOSTON

MYSTIC RIVER

SUMMER

ANDREW

HANOVER

SCOLLAY SQ

PEMBERTON SQ

COURT

CORNHILL

WASHINGTON

WINTER

TEMPLE PL

PROVINCE

SCHOOL

PARK

TREMONT

ST

COLUMBUS AV
TREMONT
SHAWMUT
WASHINGTON
HARRISON
ALBANY
SOUTHAMPTON
READING
GERARD
ATKINSON
HILTON
JAMES
WARREN
APPLETON
CHANDLER
DARTMOUTH
CLARENDON
BERKELEY
ARLINGTON
ARLINGTON SQUARE
BOYLSTON
PARK
TREMONT ST
STUART ST
KNEELAND
BRADFORD
HAWMUT
WASHINGTON
HARRISON
MILFORD
HARRISON AVE
DOVER
ALBION
VILLAGE
EMERALD
MIDDLESEX
COMPTON
PORTER
KIRKLAND
WHEELER ST
MELROSE
WINCHESTER
PIEDMONT
CHURCH
BROADWAY
CARVER
MASON
CHAUNCY
WASHINGTON
ESSEX
TYLER
HUDSON
SHAWMUT
WEST SPRINGFIELD
WORCESTER
CONCORD
RUTLAND
NEWTON
PEMBROKE
BROOKLINE
CANTON
DEDHAM
UPTON
PILLSBURY
NOYES
MALDEN
MYSTIC
WALTHAM
EAST SPRINGFIELD
LENOX
NORTHAMPTON
MASSACHUSETTS
EAST CONCORD
EAST NEWTON
EAST BROOKLINE
EAST CANTON
EAST DEDHAM
PLYMPTON
WEST REVERE
RANDOLPH
OLIVER ST BRIDGE
SOUTH BAY
BROADWAY BRIDGE
DORCHESTER AVE
FOUNDRY
DORCHESTER
W. FIRST
W. SECOND
W. THIRD
W. FOURTH
W. FIFTH
BROADWAY
GRANITE
BALDWIN
RICHARDS ST
MIDWAY
FORT

# DOWNTOWN BOSTON

SHOWING CENTRAL ARTERY, EMBANKMENT ROAD,
SURFACE STREET IMPROVEMENTS AND ONE-WAY STREETS

ACCOMPANYING REPORT ON

## THE MASTER HIGHWAY PLAN

FOR THE

**BOSTON METROPOLITAN AREA**

PREPARED FOR

**THE JOINT BOARD FOR THE**
**METROPOLITAN MASTER HIGHWAY PLAN**

BY

CHARLES A. MAGUIRE AND ASSOCIATES
ENGINEERS BOSTON

IN COOPERATION WITH

DELEUW, CATHER & CO. CHICAGO
J. E. GREINER CO. BALTIMORE

SCALE IN FEET

0 200 400 600 800 1000 1200

THE COMMONWEALTH OF MASSACHUSETTS
STATE PLANNING BOARD
THE METROPOLITAN DISTRICT
OF BOSTON

1943

MAP SHOWING
# THE MASTER HIGHWAY PLAN
FOR THE
## BOSTON METROPOLITAN AREA

ACCOMPANYING A REPORT PREPARED FOR
THE JOINT BOARD FOR THE
METROPOLITAN MASTER HIGHWAY PLAN
BY
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ENGINEERS BOSTON
IN COOPERATION WITH
DELEUW CATHER & CO. CHICAGO
J. E. GREINER CO. BALTIMORE

LEGEND
- EXPRESSWAYS
- LIMITED & SEMI-LIMITED ADJUNCTS TO THE EXPRESSWAY SYSTEM
- STREET IMPROVEMENTS
- INTERSECTION IMPROVEMENTS
- MAJOR STREETS
- PARKWAYS

Boston Public Library

CARLISLE

CONCORD

BEDFORD

BILLERICA

WILMINGTON

TEWKSBURY

LINCOLN

WESTFORD

CHELMSFORD

PROPOSED ROUTE 128

U.S. 3

EXPRESSWAY

RT. 38

NORTHWEST

MAIN ST.

HIGHLAND AVE.

WINTHROP ST.

FELLSWAY WEST

RT. 129

EXPRESSWAY

FELLSWAY

FELLSWAY EAST

CONCORD HWY.

36

37

38

52

54

FELLSWAY
FELLSWAY EAST
EXPRESSWAY
NORTHERN
MAIN ST.
40
BROADWAY
NORTHEAST
NEWBURYPORT
RESSWAY
RT 107
U.S. 1A
TPK
U.S. 1
PROPOSED ROUTE 128
1
60
42
LYNN
SAUGUS
WAKEFIELD
LYNNFIELD
PEABODY
DANVERS
SALEM
MARBLEHEAD
BEVERLY
LYNN WATER WORKS RESERVOIR

WAYLAND
WALTHAM
WESTON
NEWTON
WELLESLEY
NEEDHAM
DOVER
BROOKLINE
CONCORD AVE.
TRAPELLO RD.
RT. 60
RT. 2
MAIN ST.
PLEASANT ST.
ARSENAL RD.
N. BEACON ST.
MARKET ST.
BRIGHTON AVE.
EMBANKMENT RD
BELT
NORTHERN ARTERY
TO U.S. 20
WESTERN EXPRESSWAY
RT. 30
COMMONWEALTH AVE.
BEACON ST.
WASHINGTON ST.
BOYLSTON ST
WORCESTER TPK.
RT. 9
RT. 16
NEEDHAM ST.
PROPOSED ROUTE 128
GREENDALE AVE.
COMMON ST.
NEWTON ST.
W. ROXBURY PKWY.
CENTER ST.
WASHINGTON ST
SPRING ST.
HYDE PARK
EXPRESSWAY
RT. 138
BLUE HILL AVE.
CUMMINS HWY.
MORTON ST.
BROOKLINE AVE.
HUNTINGTON AVE.
SEAVER ST.
COLUMBUS AVE.
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THE COMMONWEALTH OF MASSACHUSETTS

STATE PLANNING BOARD

# THE METROPOLITAN DISTRICT OF BOSTON

SCALE IN FEET

1947

LEGEND

THIS MAP ORIGINALLY PREPARED BY THE DIVISION OF METROPOLITAN PLANNING

## MAP SHOWING

# THE MASTER HIGHWAY PLAN FOR THE BOSTON METROPOLITAN AREA

ACCOMPANYING A REPORT PREPARED FOR THE JOINT BOARD FOR THE METROPOLITAN MASTER HIGHWAY PLAN

BY

CHARLES A. MAGUIRE AND ASSOCIATES
ENGINEERS BOSTON

IN COOPERATION WITH

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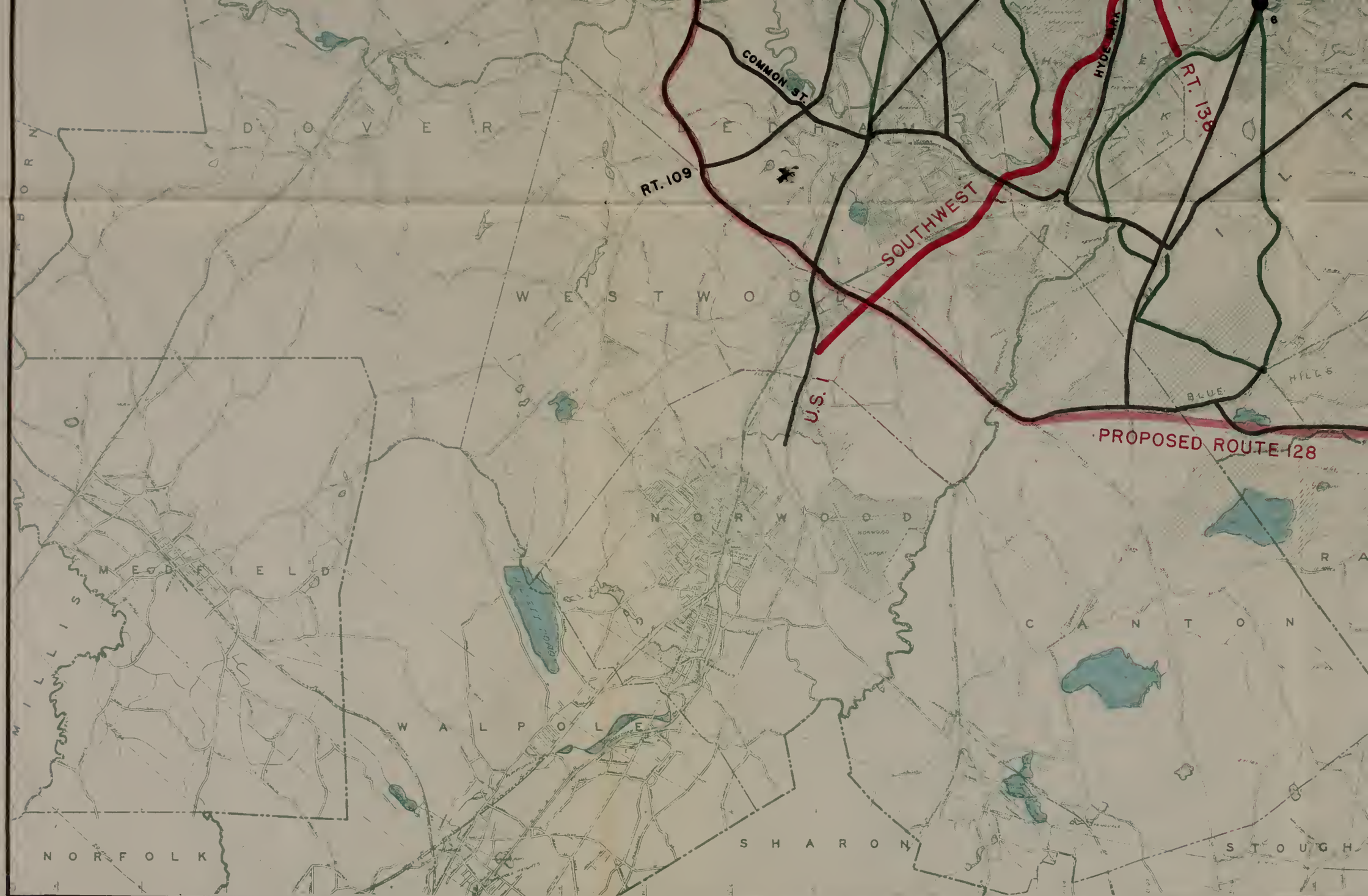
J. E. GREINER CO. BALTIMORE

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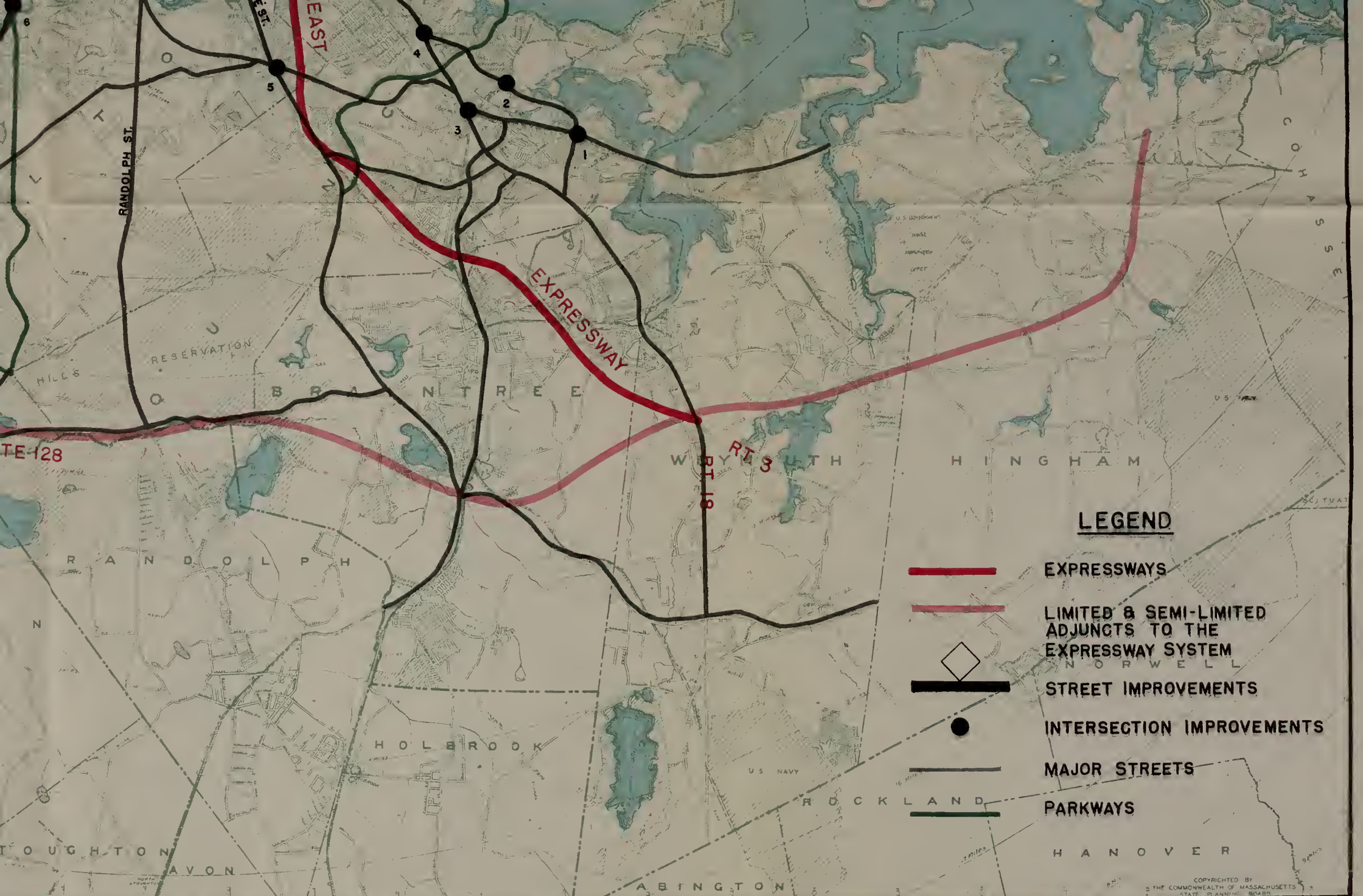
EAST
RANDOLPH ST.
EXPRESSWAY
RT 3
RT 18
TE-128
RESERVATION
HILLS
BRAINTREE
WEYMOUTH
HINGHAM
RANDOLPH
HOLBROOK
NORWELL
US NAVY
ROCKLAND
HANOVER
TOUGHTON
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ABINGTON
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